World Petroleum

FEBRUARY 1953

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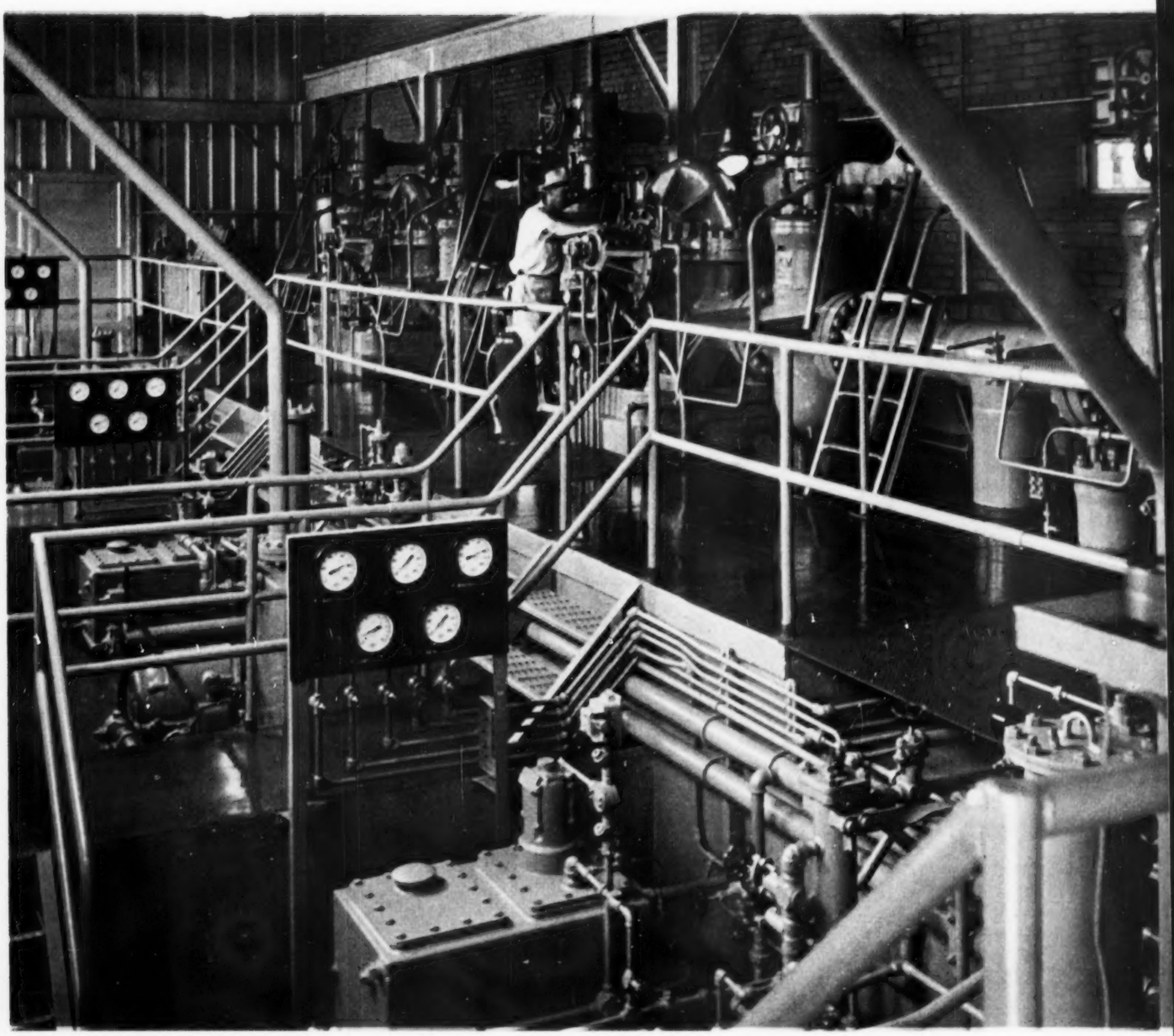

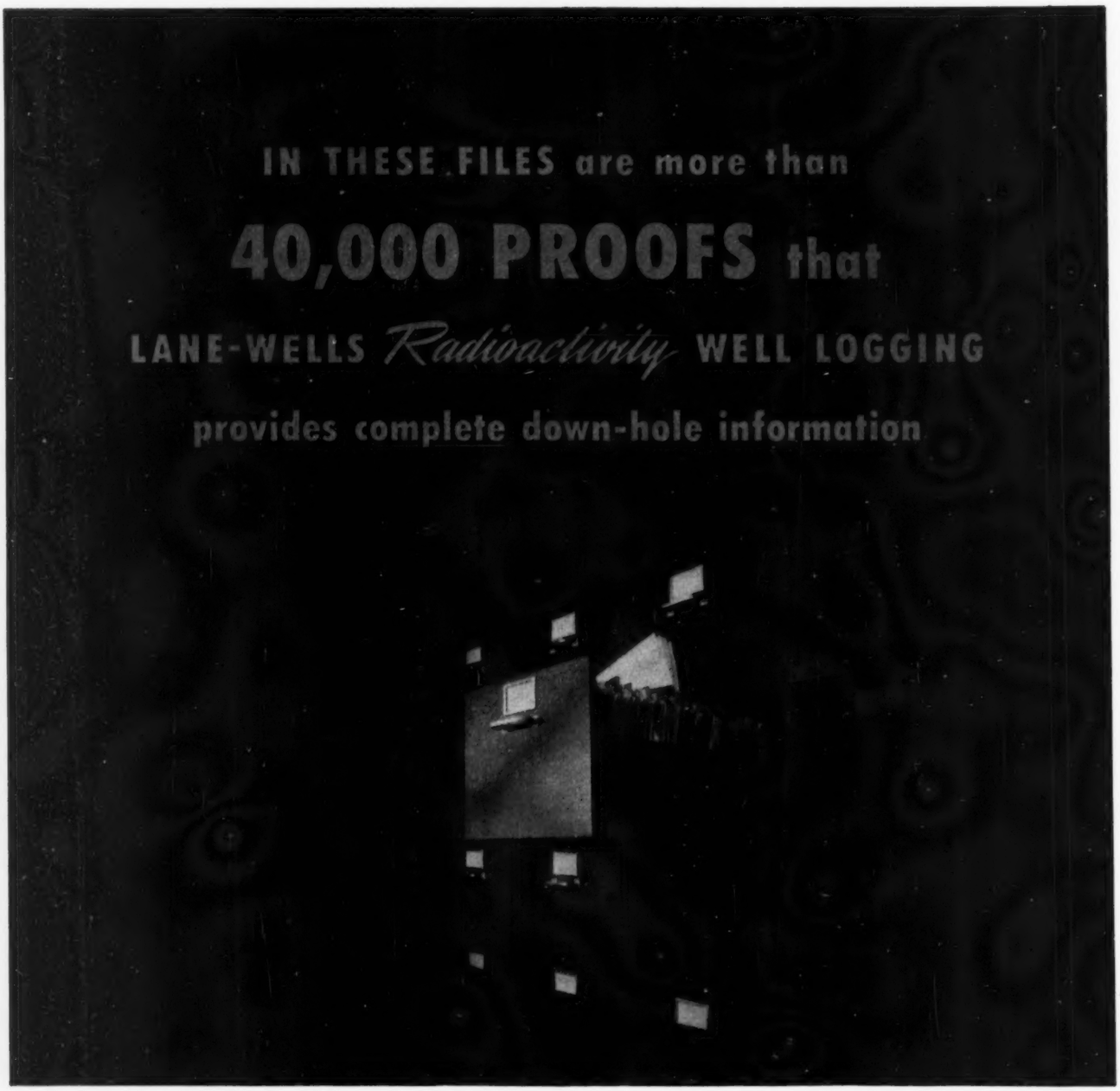
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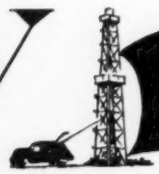

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. . . The development of Burrless Bullets
. . . How the simultaneous firing method gets better results
. . . How simple, scientific design provides greater power and deeper penetration
. . . A series of penetration tests covering all sizes of McCullough Burrless Bullet Perforators

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. . . Strip Carrier and Solid Bodied Guns
. . . Advantages of Glass Jet Units
. . . Recommendations for use
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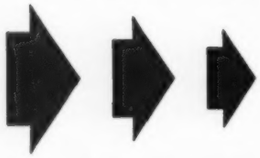
SUMMARY, RESULTS IN THE FIELD, AND CONCLUSIONS

CLIP AND



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Gentlemen:
Please send me my free copy of "How To Get More Oil" by return mail.

NAME .....
COMPANY .....
ADDRESS ..... CITY ..... STATE .....
POSITION .....
.....

We can learn from bankrupt Micawber

"MY advice, Copperfield, you know. Annual income twenty pounds, annual expenditure nineteen-nineteen-six, result happiness. Annual income twenty pounds, annual expenditure twenty-ought-six, result misery. The blossom is blighted, the leaf is withered—in short you are forever floored. As I am!"

This is probably the most famous financial counsel in all English literature, offered a hundred years ago by Charles Dickens' character the bankrupt Micawber to the hero David Copperfield. As advice it is just as good in 1953 as it was in 1849, and just as sound for a nation as for an individual.

In 17 of the last 20 years, Uncle Sam has followed Micawber's practice, not his advice. Our national balance sheet has been, figuratively, "annual income twenty pounds, annual expenditure twenty-ought-six". Ahead of us as a nation, if we continue this irresponsible policy, is Micawber's dire predicament, "blossom blighted, leaf withered—forever floored".

There is no sane reason why the world's richest nation should continue to live the financial life of a profligate bankrupt. It is time now to set our house in order. The program called for is simple: (1) Eliminate waste and extravagance in government spending; (2) Balance the Federal budget; (3) Control the national debt and reduce taxes.

By such positive action we can protect future happiness—and prevent misery—for ourselves, our children and our children's children.

QUALITY V YOUNGSTOWN SERVICE

The Youngstown Sheet and Tube Company

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Here are the Floating Roof Specifications which 30 years' experience has shown are necessary for best performance.

1. **Well designed, close fitting Seals; including Primary, Secondary, and Top Seals for maximum conservation.**
2. **Pontoons divided into large number of GAS-TIGHT compartments for safety.**
3. **Pontoon compartments Deep and Roomy so they may be easily entered and inspected for maintenance if necessary.**
4. **Pontoon compartments uncluttered with framework for easy inspection and maintenance.**
5. **COMPLETE CLEAN Drainage.**
6. **Roof designed to take ALL LOADS to which the structure may be subjected, with better than normal safety factor.**
7. **Pontoons designed to maintain buoyancy under all anticipated conditions.**
8. **Assure full use of the capacity of the tank for in and out storage.**

These specifications are met in every respect by the Wiggins Floating Roof and ONLY the Wiggins Floating Roof

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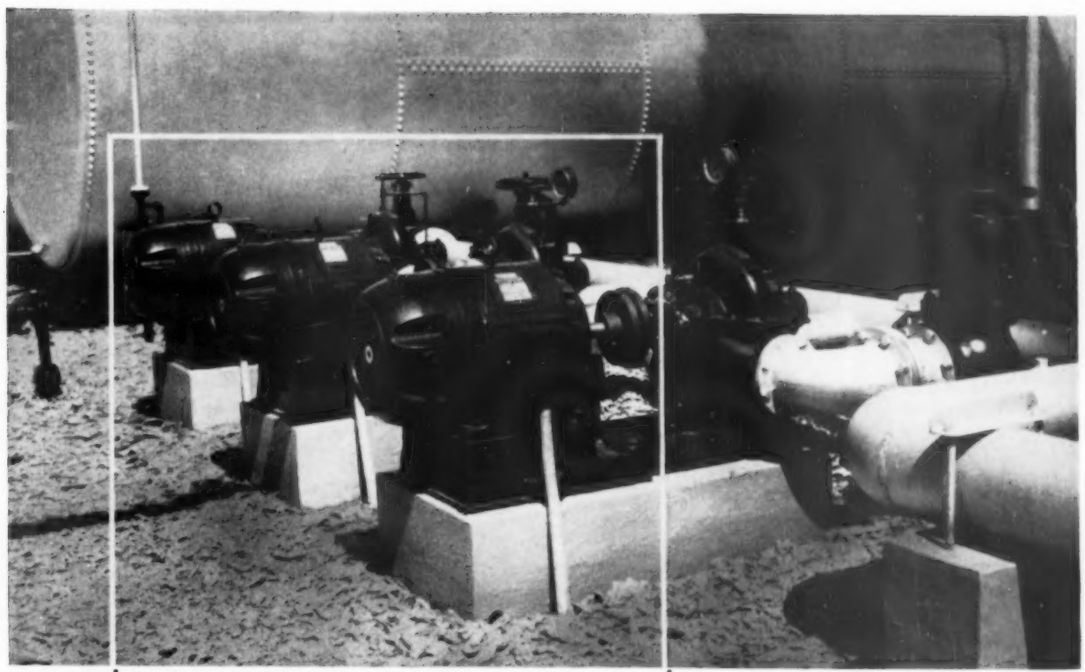
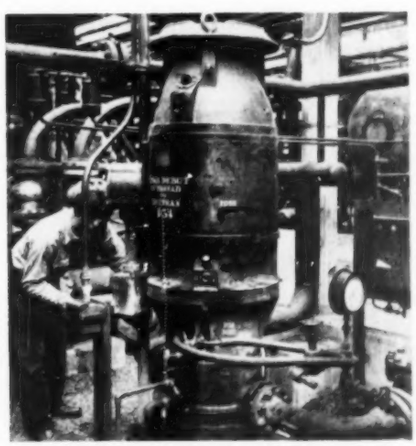


3 centrifugal, circulating-water pumps at refinery driven by G-E explosion-proof, squirrel-cage, induction motors—300-hp, 1800 rpm each.

G-E Explosion-Proof MOTORS give you continuous SAFETY

General Electric, using long experience with oil industry needs, has built a broad line of explosion-proof motors that reduce your refinery hazards with these features:

- **Sturdy, cast-iron, double-shell frame and end shields, plus . . .**
- **Reinforcing ribs for strong enclosure . . .**
- **Non-sparking fan . . .**
- **Explosion-proof box**



G-E vertical, explosion-proof, induction motor drives refinery charge pump.

THESE BUILT-IN SAFETY FEATURES HELP YOU!

Save Installation Expense—No special isolation or remote coupling needed.

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G-E Control Puts Safety First, Too! G-E oil-immersed starters have all contact tips, connections, terminals at least 6" below oil level. Coordinated starters, circuit breakers, overload relays protect motor under all overload and short circuit conditions.

See your G-E representative. Learn how G-E motors and control make continuous safety work to your profit. Write for Bulletin GEA-4131. International General Electric Co., Apparatus Sales, 570 Lexington Ave., New York 22, N. Y., U.S.A. TA-53-176

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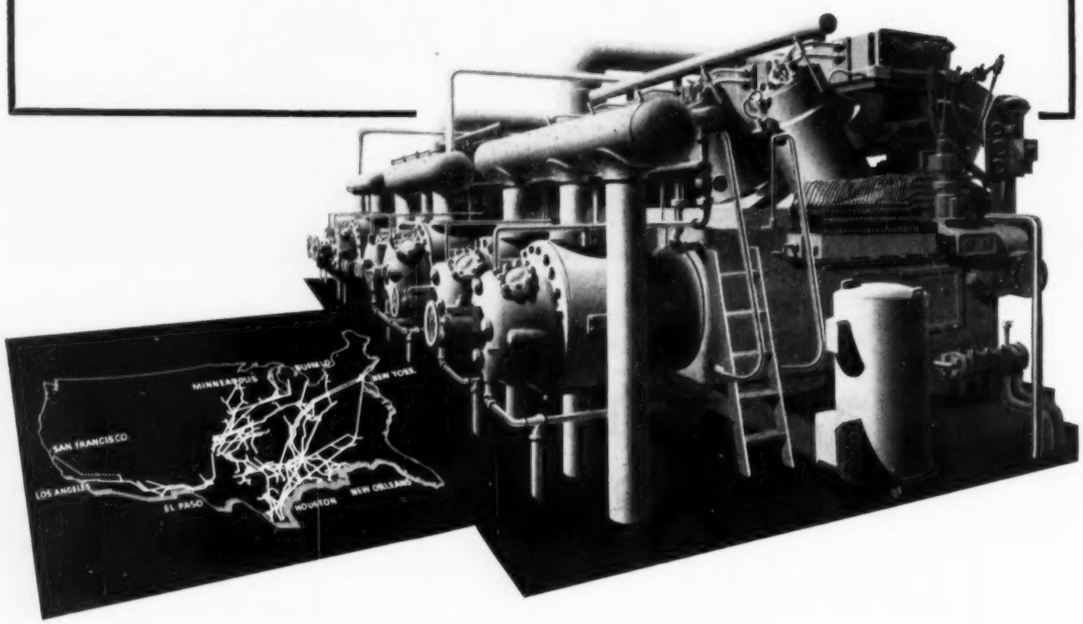
GULF SECURITY OIL

provides better lubrication
for pipe line compressor units,
helps prevent operating troubles



Here's the lubricant you can depend on to help keep your pumping stations operating smoothly and continuously—Gulf Security Oil. It provides effective protection for cylinders and bearings in both engines and compressors.

Because of its excellent resistance to oxidation, Gulf Security Oil stands up for many hundreds of hours without any appreciable change in its original properties. After years of operation with this quality lubricant, equipment shows remarkable freedom from cylinder wear and a minimum of carbon deposits on valves and rings. And because oil control rings are kept clean, oil consumption is remarkably low.

Operators of the many units lubricated with Gulf Security Oil report that this quality lubricant helps them get more operating hours between overhauls, and avoid unscheduled shutdowns.

For additional information on Gulf Security Oil and for the services of a Gulf Sales Engineer, get in touch with your nearest Gulf office today. Write, wire, or phone.

Gulf Oil Corporation · Gulf Refining Company,
Pittsburgh 30, Pennsylvania.

GULF INDUSTRIAL LUBRICATION

A MARKET IS BORN

February 2, 1923

On a cold, February day, thirty years ago, a motorist drove into a little service station in Dayton, Ohio. He bought the first gallon of a new type of gasoline—called "Ethyl" gasoline. That simple act started a new trend in motoring. It was the beginning of the market for premium gasolines as we now know it.

Today that market has grown to millions of car owners buying billions of gallons of premium fuels every year. It has become a major market for the petroleum industry.

Did you ever stop to consider what caused this tremendous growth?

One reason we can think of is the continuous year-in and year-out advertising and promotion of "Ethyl" gasoline by Ethyl Corporation. For example, there's been a constant flow of magazine, radio, and now television messages to car owners. New customers for your best gasoline have been constantly sought out, and old ones reminded of its benefits. In 1952, Ethyl magazine advertising reached 48 million people every month. During the heavy summer driving season, television and drive-in movies reached millions more.

What about the future of the market for premium gasolines? In the years ahead millions of new car owners will come into the picture. These people, too, must be sold if this market is to be maintained. That's why Ethyl's plans for the future include an expanded advertising and promotional effort, plus a wide variety of dealer education programs.

ETHYL CORPORATION
New York 17, N. Y.

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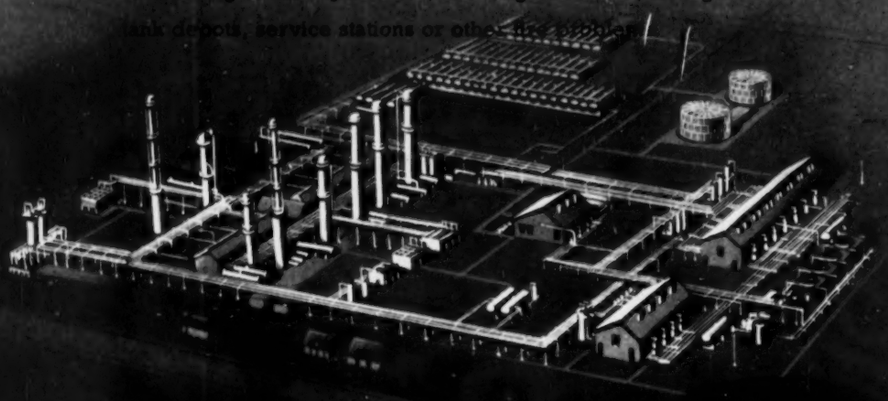
that he is surrounded every day by the most serious of all fire risks. He knows, too, that every fire no matter how small must be stopped immediately if he is to avoid a major fire where all his experience combined with the use of major foam fire fighting equipment will be needed to subdue it. The Pyrene Company is the largest manufacturer in the world of Mechanical Foam Fire Fighting Equipment and Foam Compound and more major oil fires have been extinguished with this equipment than with any other. The Company's engineers are at your disposal in any part of the world for consultation on this vitally important matter. Write now for their expert advice and recommendations concerning oil and spirit fires, affecting refineries, storage tank depots, service stations or other fire problems.



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complete refineries
complete chemical plants

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Canada

A recent completion at Edmonton.

at work around the world

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Brazil
Holland
Philippine Islands
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and in the USA

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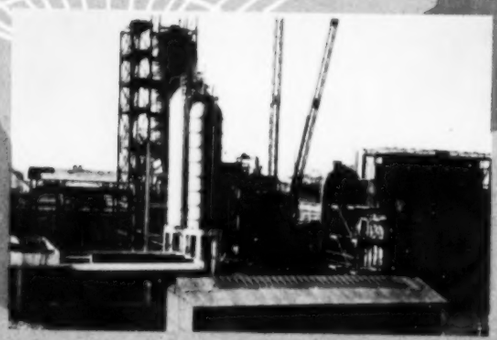

Catalytic cracking and other units under construction in France.

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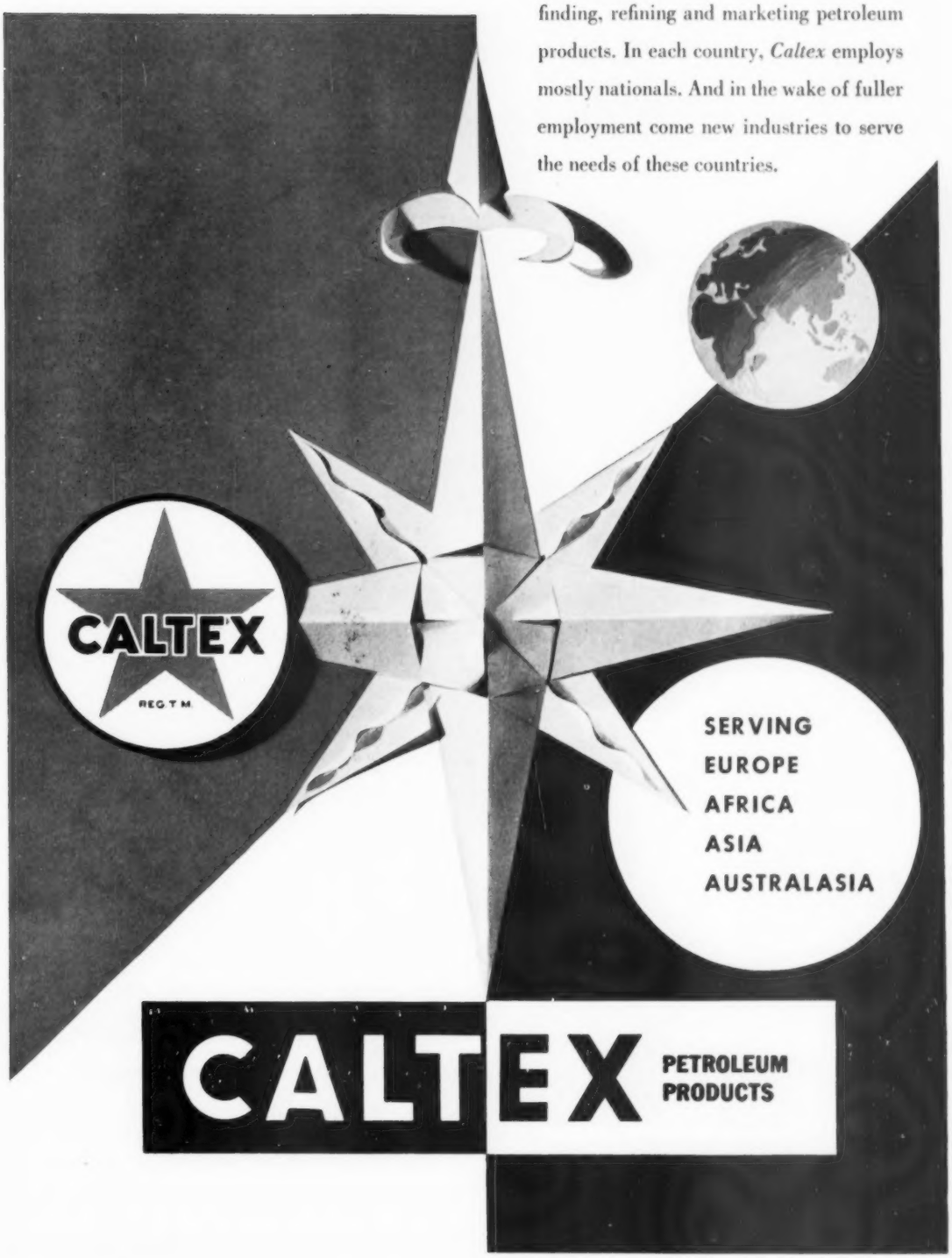
Throughout the Eastern Hemisphere, the free peoples of 67 lands assist *Caltex* in finding, refining and marketing petroleum products. In each country, *Caltex* employs mostly nationals. And in the wake of fuller employment come new industries to serve the needs of these countries.



THE NH RANGE OF FORGED STEEL VALVES AND FITTINGS

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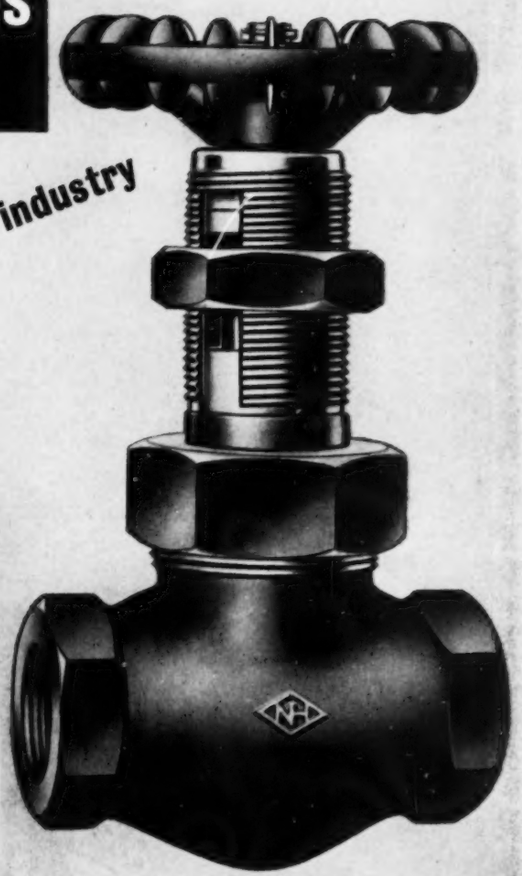

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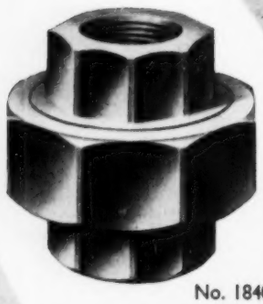

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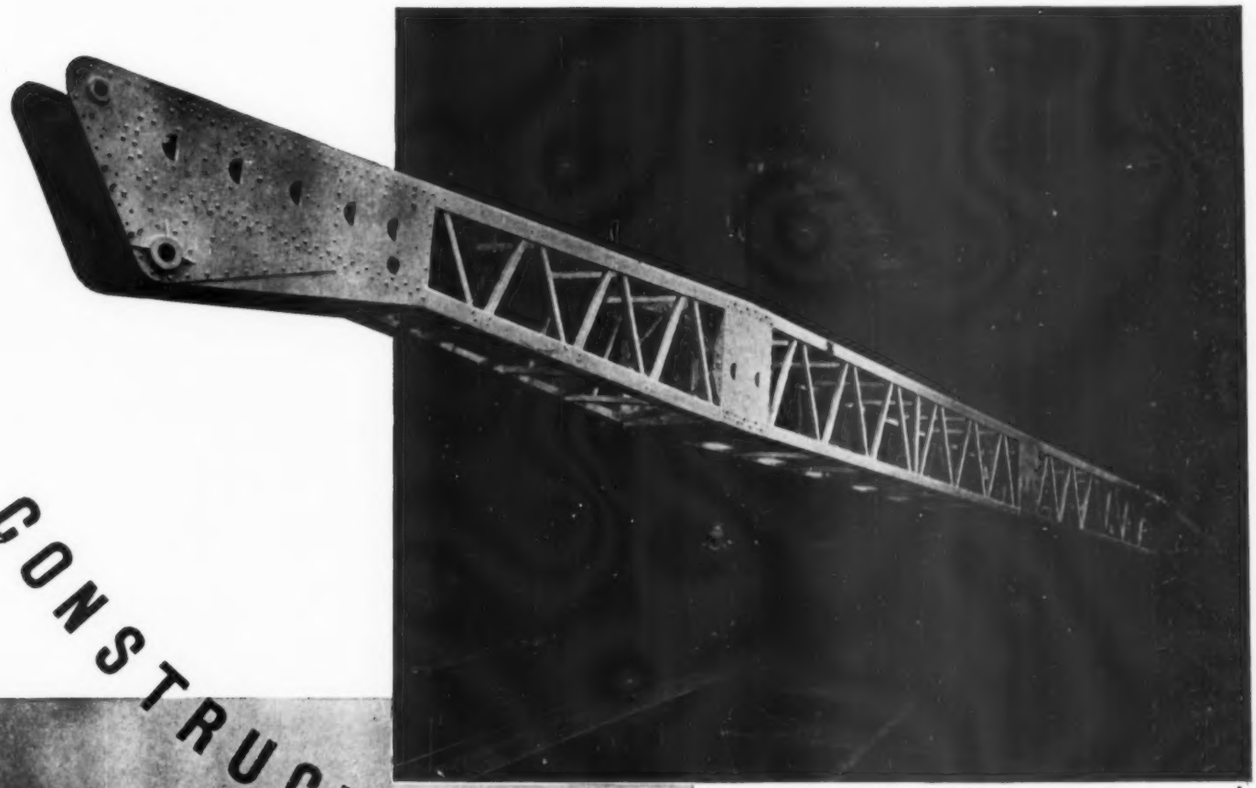

150ft. Mild Steel Riveted Derrick Mast photographed in the Butterley Constructional Department.

CONSTRUCTIONAL STEELWORK by

A view taken in the open before despatch.

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Built as only IH can build them

Here are new International Trucks, designed for truck buyers who consider *all* the costs and *must* have top performance.

This *new* International line offers 168 basic models, from ½-ton pickup to extra heavy-duty off-highway units. And each *new* model has the same fine engineering that has kept International a leader in heavy-duty sales for 21 years.

Every one of the 307 new features in this line has been developed and proved in the laboratory, and on the road.

This all means *new* truck quality for you—the finest value International has offered in 45 years of truck manufacturing. For details on this new, complete line, see your International Distributor now. International Harvester Export Company, 180 North Michigan Ave., Chicago 1, U.S.A.

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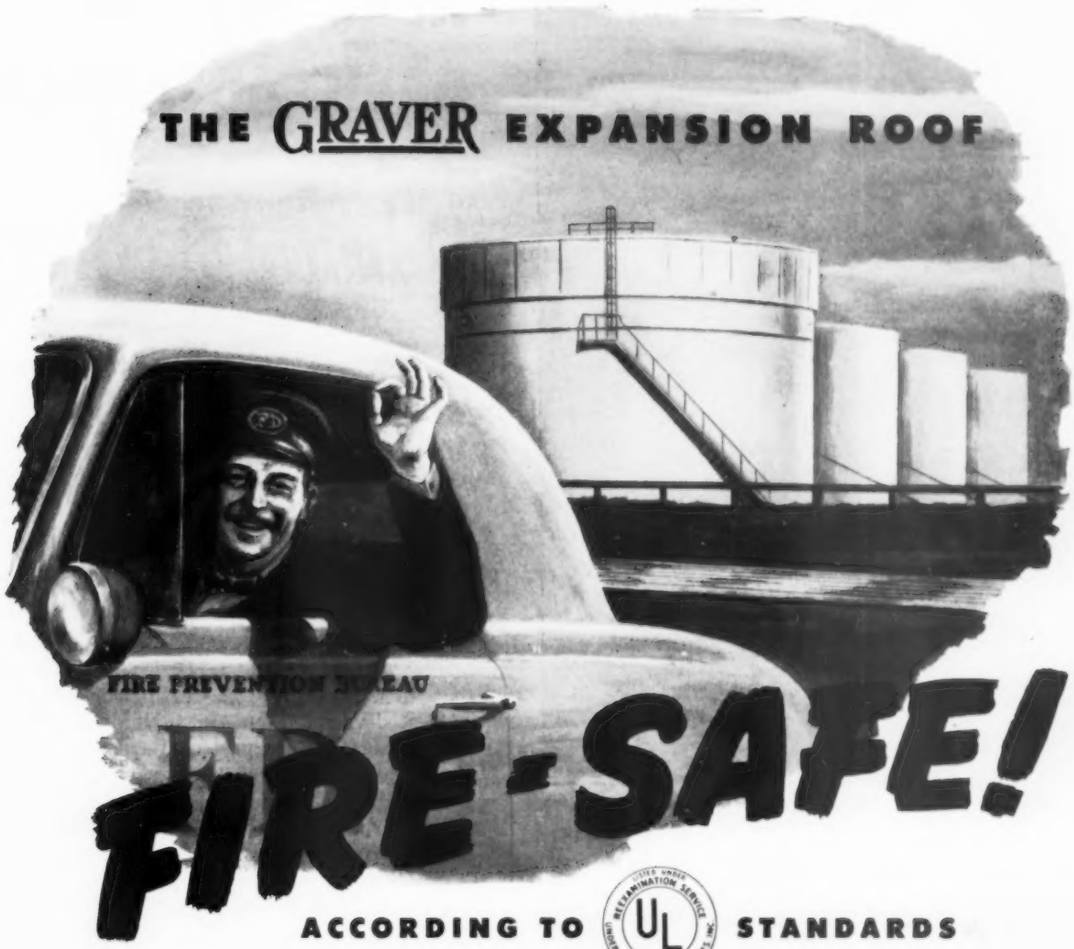
THE GRAVER EXPANSION ROOF



FIRE-SAFE!

ACCORDING TO UL STANDARDS

"The use of an expansion roof on a storage tank handling volatile petroleum products is considered to be conducive to the reduction of the fire hazard, and to the conservation of the liquid stored." That's the conclusion reached by Underwriters' Laboratories, Inc., as a result of their examination of the Graver Expansion Roof.

The report continues: "A study of the design showed that the possibility of sparks being struck by moving parts is not likely, and that metallic contact between the roof and the shell reduces the danger from the generation of static electrical charges."

No Graver Expansion Roof has ever been involved in a fire during the decade since the design was originated. This further substantiates the Underwriters' seal of approval.

GRAVER TANK & MFG. CO., INC.

EAST CHICAGO, INDIANA

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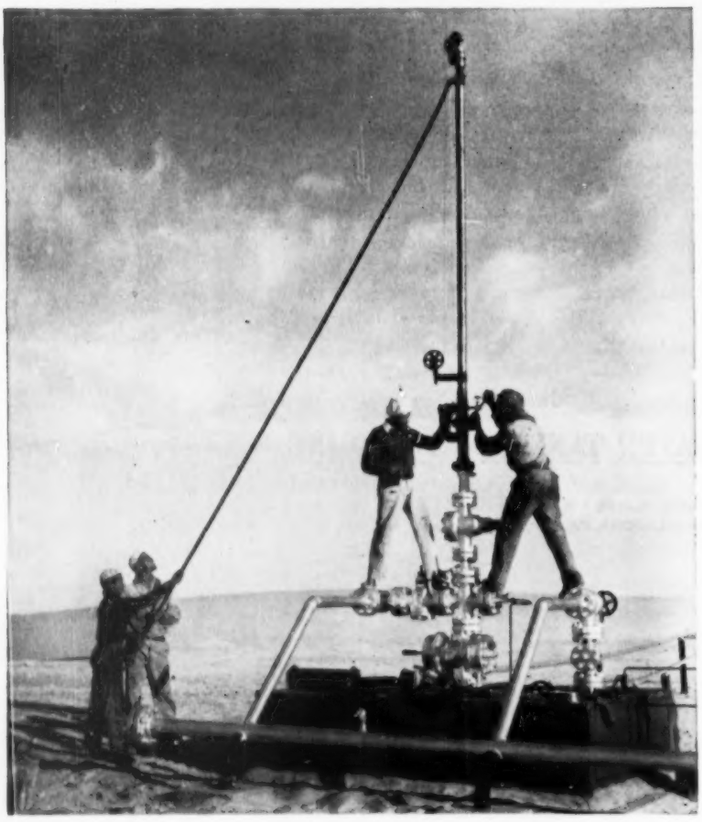
GRAVER

Chemist draws sample from press in large British refinery. Lines carrying lubricating oils are controlled by Audco-Nordstrom valves.

Operators install Audco-Nordstrom equipped Christmas tree in an Arabian field.



HERE ARE THE BASIC ADVANTAGES OF A *Lubricated* VALVE

There's nothing complicated about valve lubrication. It affords certain very basic advantages not found in a non-lubricated valve:

MOST POSITIVE SEAL

The pressurized film of lubricant in an Audco-Nordstrom makes a tight, leak-proof seal that is impossible to attain by pressing two pieces of metal together.

RESISTANCE TO WEAR

No matter how smooth the surfaces are at first, extended metal-to-metal friction results in abrasion that wears away the vital seating surfaces of a non-lubricated valve. In an Audco-Nordstrom, the entire contact surfaces are protected from abrasion by a film of lubricant.

RESISTANCE TO CORROSION AND EROSION

The corrosive and erosive action of many line fluids eats away unprotected metal. The seating surfaces of an Audco-Nordstrom valve, protected by a film of lubricant, are never exposed to the line fluid.

QUICK, EFFORTLESS OPERATION

Valves that depend upon wedging for a seal require greater effort to operate because the pressure that produces the seal must be overcome when the valve is turned. Audco-Nordstrom Lubricant-Sealed valves operate easily and quickly because the plug slides on a film of lubricant.

These reasons show why Audco-Nordstrom valves are your best buy. For year after year of steady, efficient operation, install Audco-Nordstrom valves.

AUDCO and Nordstrom

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Magcobar, for example, is the highest quality barite you can buy. Because of its purity and correct particle size it produces heavy drilling muds of low viscosity . . . muds that are easier and less costly to control. Magcobar quality is the result of constant laboratory research and carefully controlled processing. So, for safer, more economical drilling . . . put Magcobar in your drill pipe . . . and circulate it. There are more than 375 Magcobar Dealers ready to service you night and day.

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Complete
DRILLING MUD SERVICE
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IS ONE OF THE DRESSER INDUSTRIES

An important member of the family of Dresser Industries since 1945, Kobe Inc. Division of Dresser Equipment Co., of Huntington Park, California, today plays a vital role in reducing operating costs for oil producers everywhere. Kobe's hydraulic oil well pumping system, featuring the famous Free Pump, has revolutionized production techniques with resultant savings on labor and equipment costs.

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Clark Bros. Co. Division, *Olean, New York.* Engines and compressors—gas, steam and diesel driven.

Dresser Manufacturing Division, *Bradford, Pa.* Oil and gas and pipe couplings, fittings and sleeves—rolled and welded rings—welding fittings and flanges.

Kobe, Inc., Division, *Huntington Park, Calif.* Complete hydraulic oil field pumping systems, including the Kobe Free Pump.

No. 6 in a series about Dresser Industries

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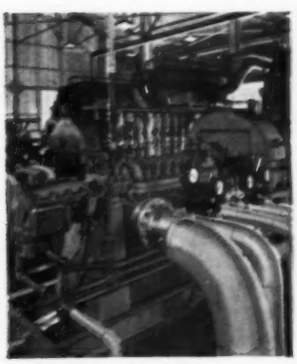
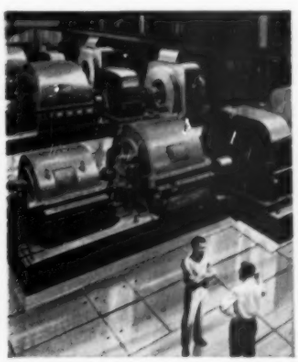


Pacific Pumps, Inc., *Huntington Park, Calif.* Centrifugal pumps, deep oilwell plunger pumps, hot oil and boiler feed pumps.



Roots-Connersville Blower Division, *Connersville, Ind.* Rotary positive blowers, gas pumps; centrifugal blowers, exhausters; positive displacement meters.

Security Engineering Division, *Whittier, Calif., Dallas, Tex.* Rock bits, reamers, casing scrapers, reamer rock bits, coring bits, Securaloy.

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Max Steineke
George Rentz

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DU PONT

PETROLEUM CHEMICALS DIVISION NEWS

DU PONT

February ★ *One of a Series of Interest to the Petroleum Industry* ★ *1953*

TECHNICAL MANAGER OF PETROLEUM CHEMICALS DIVISION

JOHN R. SABINA joined the Du Pont Company in 1937 after many years of development work in motor fuels and lubricants. He is a graduate of the University of Pennsylvania with a B.S. degree in electrical engineering.

After two years as an electrical engineer for the Baldwin Locomotive Works in Philadelphia, Sabina joined the Atlantic Refining Company in 1925 as a test engineer. There he developed the first audio-electrical device for measuring detonation in internal combustion engines. In 1936 he was named manager of Atlantic's Automotive Laboratory.

Sabina came to Du Pont initially to head a new group formed in the Organic Chemicals Department to develop chemicals for the petroleum industry. One of his first projects at Du Pont was designing the Petroleum Chemicals Laboratory at Deepwater Point, N. J. He became manager of this laboratory in 1938.

In 1944 he was transferred to Wilmington as manager of the Petroleum Chemicals Section of the Alcohol Division, in charge of both sales and development. When the present Petroleum Chemicals Division was formed in 1946 to manufacture and market all Du Pont petroleum additives including tetraethyl lead, Sabina was named technical manager of the new division.

JOHN R. SABINA

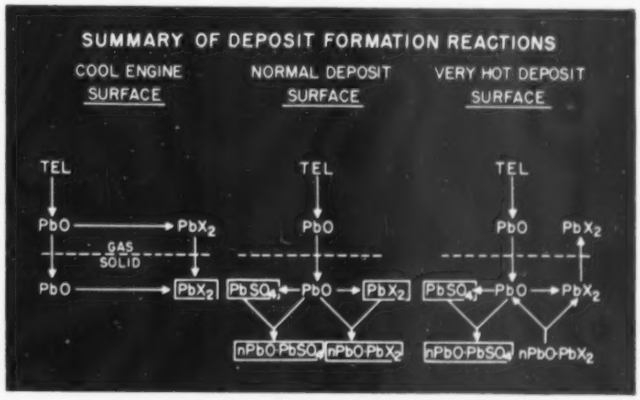
During World War II, he served as chairman of a Coordinating Research Council group formed to advise the armed services on gasoline storage stability problems. He has written numerous technical articles and papers for scientific publications and been especially active in the American Society for Testing Materials, the Society of Automotive Engineers and the Coordinating Research Council and the A.P.I. In 1944 he was elected vice president in charge of fuels and lubricants for the S.A.E.

Investigating the "How" and "Why" of Engine Deposit Formation

Studies at the Du Pont Petroleum Laboratory reveal the sequence of chemical reactions which occur in engine deposit formation.

The deposits which form on combustion chamber walls increase the tendency of fuels to knock.

This fact has long been known to petroleum and automotive engineers. But very little was known about the reaction mechanisms which result in the accumulation of these deposits—especially with fuels containing tetraethyl lead. And nearly all modern automotive fuels contain this compound.



THIS CHART SHOWS the compounds found in the deposit and the reactions by which they are produced under each of the temperature conditions studied.

Since Du Pont is a large supplier of tetraethyl lead, the Du Pont Petroleum Laboratory undertook a study of the reactions leading to the formation of the lead salt portion of combustion chamber deposits.

SMALL AMOUNT REMAINS

Although almost all tetraethyl lead decomposition products are removed from the combustion chamber with the exhaust gases, a small amount remains on the chamber walls in the form of inorganic lead salts.

Many of these salts are formed as a result of chemical reactions which occur in the combustion chamber after the fuel-air charge is burned.

In the studies, it was first determined that the reactions *might* influence deposit formation during any of the following stages:

1. Combustion.
2. Vapor state reactions following combustion.
3. Condensation of lead compounds

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OVER

PETROLEUM CHEMICALS DIVISION
NEWS

CONTINUED **Deposit Studies**

on cylinder wall.

4. Gas-solid reactions between lead salts and chamber gases.
5. Solid state reactions between lead salts in deposit.
6. Vaporization of lead salts.

The question then was, *how* do these reactions influence deposit formation?

TEMPERATURE INFLUENCE

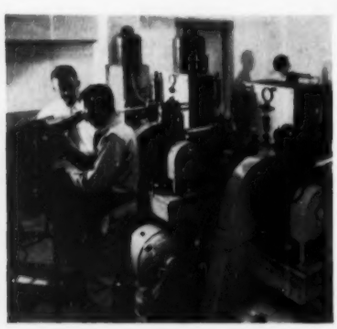
After studying each of these stages in the reaction sequence shown, the Petroleum Laboratory arrived at the following conclusions:

The course of the reaction is dependent on the temperature of the combustion chamber walls.

When the walls are clean and relatively cool (ca. 200°C.), the reactions result in lead halide deposit formation. But after deposit growth has produced an insulating area, the surfaces are hotter and a variety of higher melting compounds are formed. When areas of the combustion chamber, such as the exhaust valve, become very hot, the deposit composition changes so that only very high melting compounds are formed.

GASEOUS LEAD OXIDE

Gaseous lead oxide, produced from the decomposition of tetraethyl lead, does not undergo vapor state reactions except when the gas layer near a clean combustion chamber surface is cool. Under these special and transitory conditions, it may be converted by hydrogen halides into gaseous lead halides.



Section of a single-cylinder engine room in the Du Pont Petroleum Laboratory.

(Continued in next column)

SOLID LEAD OXIDE

Solid lead oxide has a short life as a deposit constituent. It is attacked by acid gases to form simple lead salts or reacts with the simple lead salts in solid state reactions to form complex lead oxysalts.

ONE OF A CONTINUING SERIES

This Du Pont study was one of a continuing series of systematic investigations on the mechanisms causing combustion chamber deposits. It is expected that it will be of considerable value to petroleum engineers who are now charting the course of developments aimed at preventing, or at least reducing, deposit formation.

The results of these studies will be made available by the American Chemical Society and the Du Pont Petroleum Chemicals Division.

NEW BOOKLET ON GASOLINE DYES

One summer day at the beginning of World War I, the German submarine *Deutschland* docked in Baltimore after a long voyage from Bremen.

Her cargo, strangely, was not torpedoes—but 500 tons of dyes. These scarce chemicals were eagerly snapped up by American manufacturers.

This incident points up the great dependence of our country on the German Chemical Industry before World War I. Then Du Pont embarked on the long, often discouraging task of developing a process for making dyes equal to or better than those previously made in Germany. It took 18 years and millions of dollars to make the operation successful. But the final result was an American dye industry equalled nowhere else in the world.

The efficient use of gasoline dyes presents a number of handling and addition problems. To help you solve these problems quickly and easily, Du Pont recently brought out a new manual on gasoline dyeing. All the latest methods of addition, including dry dye eductor systems, are fully discussed.

It also contains data on meeting color requirements for military, aviation and leaded motor fuels. And full information – with solubility charts and spectrophotometer curves–on the complete line of Du Pont gasoline dyes is included.

For your copy, ask your Du Pont Petroleum Chemicals representative or district office for the booklet, "Du Pont Gasoline Dyes."

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Funny Thing — he really had something!

"The miracle of the century!" he would rant. "The most sensational discovery of all time! Positively guaranteed to restore natural color to the hair, free you from the crippling clutches of rheumatism, break the most stubborn fever, cure coughs, colds, backache and liver complaints!

"Now to you, my friends, as a special introductory offer, this bottle, which usually sells for $15 and more is yours . . . not for $10, not for $5, but for the amazing low price of . . ."

Pure hokum, of course. For little did the medicine man realize, when he bottled crude oil out of the ground, that his most extravagant claims could not do justice to the real capabilities of this "liquid gold." He really had something—and didn't know it.

His "Rock Oil Nostrum" really *was* the miracle of the century!

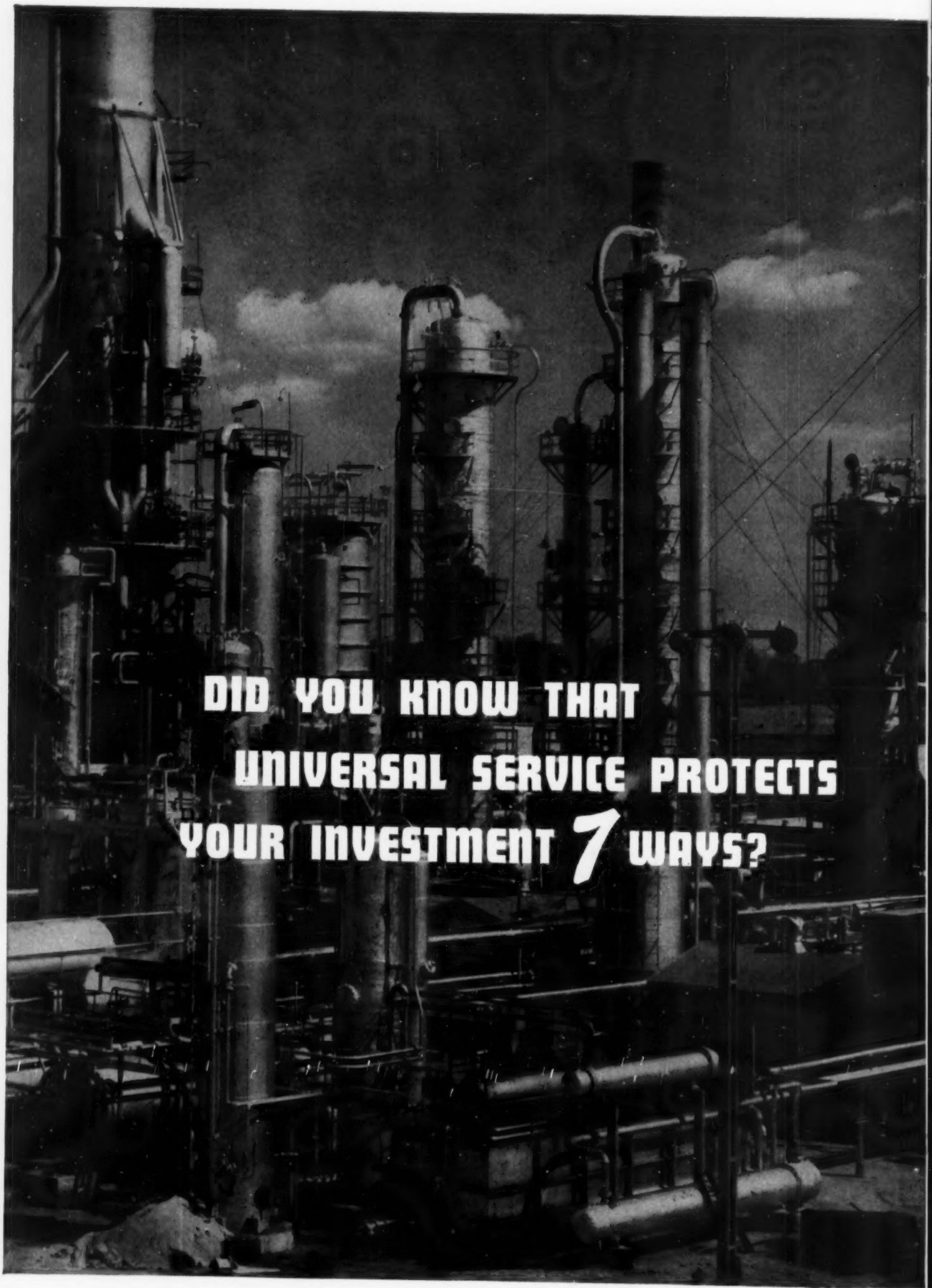
From his giant economy-sized bottle have since flowed the oil and gasolene that made the automobile possible . . . the lubes and greases that have enabled machines to take over man's back-breaking jobs. From that miraculous bottle have come asphalt, insecticides, wax, plastics, literally hundreds of useful products—even drugs "to cure coughs, colds, backache and liver complaints!"

Cities Service, an oldster in the oil business, has been responsible for many of these petroleum miracles. It is pouring more products out of that bottomless bottle every day. The men in its Miracle Department (petrochemists, they're called), say that oil has just been flexing its muscles—we haven't even begun to see all it can do.

To put it very simply: You and I live better, more comfortably, because petroleum was discovered. And that's no hokum!

CITIES SERVICE

Quality Petroleum Products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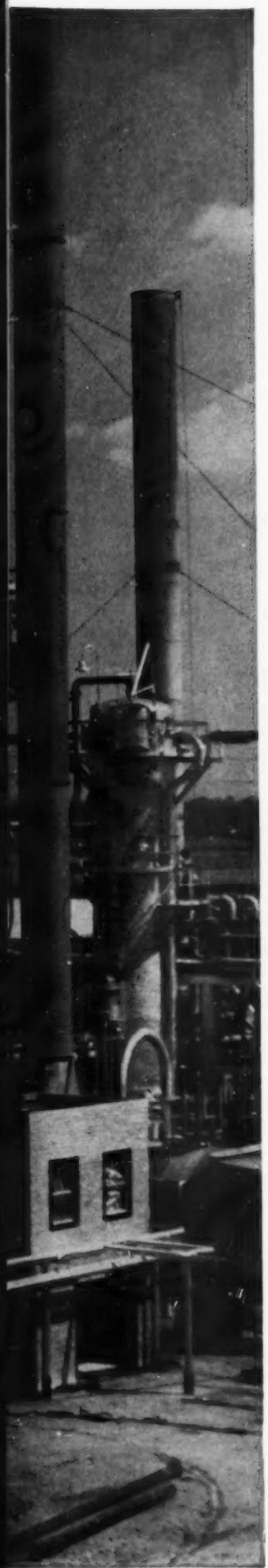
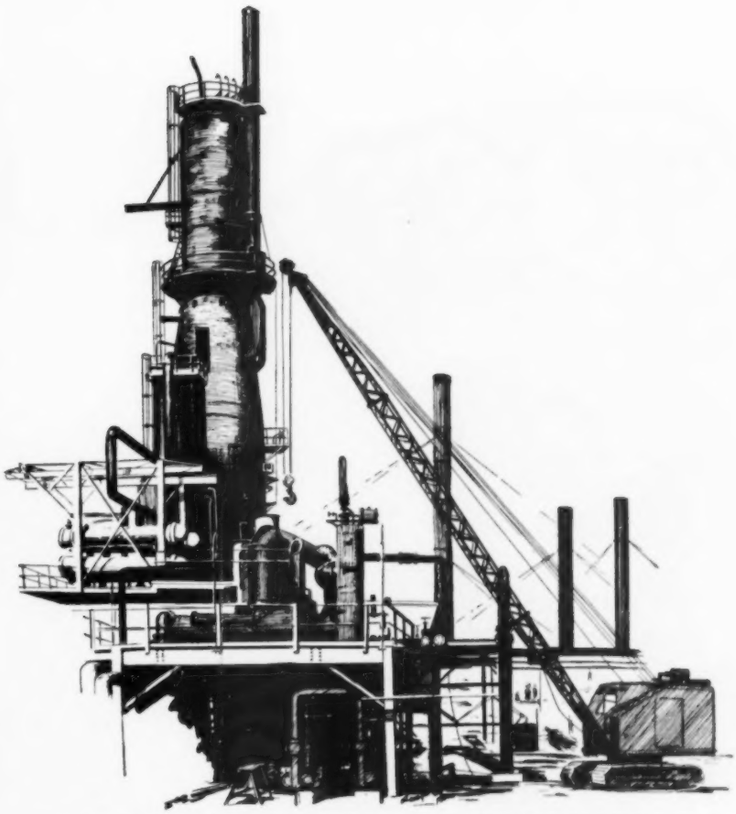
UNIVERSAL SERVICE PROTECTS
YOUR INVESTMENT 7 WAYS?





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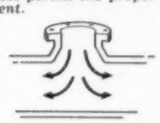
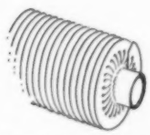
The new Fluor Fin-Fan now comes equipped with *Transaire Sections,* an improved heat transfer surface that holds velocity pressure loss to a minimum, provides smoother flow into and out of tubes, increases the safety factor, reduces operating and maintenance costs and can be assembled and dismantled for cleaning and replacements more easily than any other air-cooled heat exchanger of conventional design.

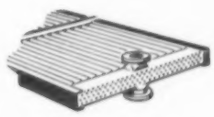
Fluor structures and mechanical equipment, with a remarkable field performance record since 1940, have been retained. Now for the first time the Fluor Fin-Fan is completely selected and supplied by Fluor. More Fluor Fin-Fans are in operation throughout the world today, and regardless of wind and water conditions, you can depend on Fluor Fin-Fans for dependable cooling service.



Less pressure drop. Inlet and outlet nozzles in the header-manifold widen out below the flange for smoother flow through the section and with less pressure drop. Area of these openings is equal to a full pipe cross-sectional area. Countersunk tube holes inside the header reduce turbulence.



More heat transfer surface. Tubes are helically wrapped with a crimped fin which presents more metal-to-metal contact and more contact to passing air for greater dissipation of heat. Tubes and fins are available in a choice of materials. Single units can be used for multiple duties.



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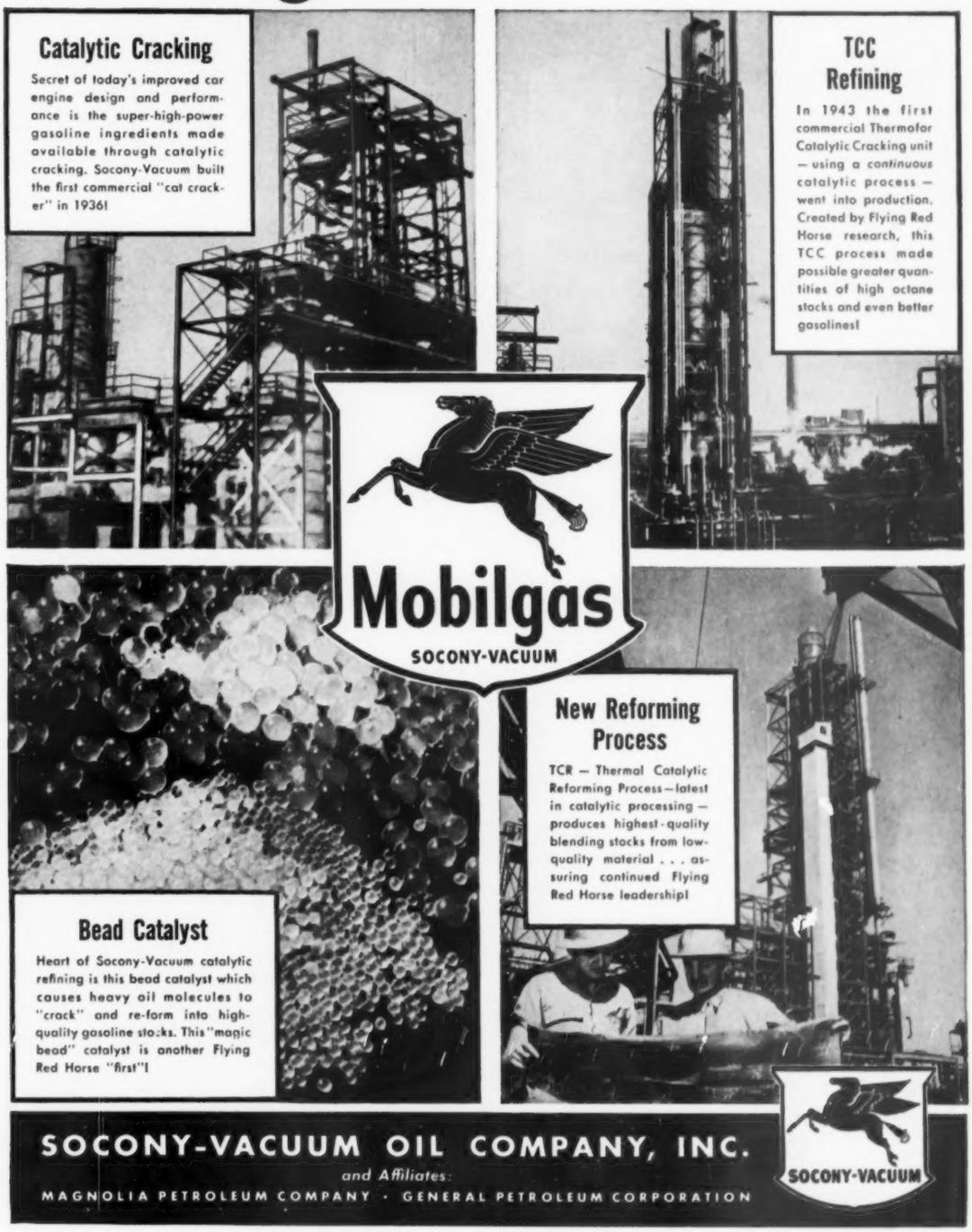
Mobilgas Milestones



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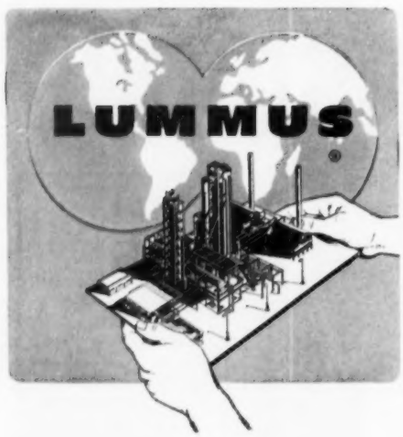

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It might even be as close as the cover of an engineering study or job proposal lying on your own desk.

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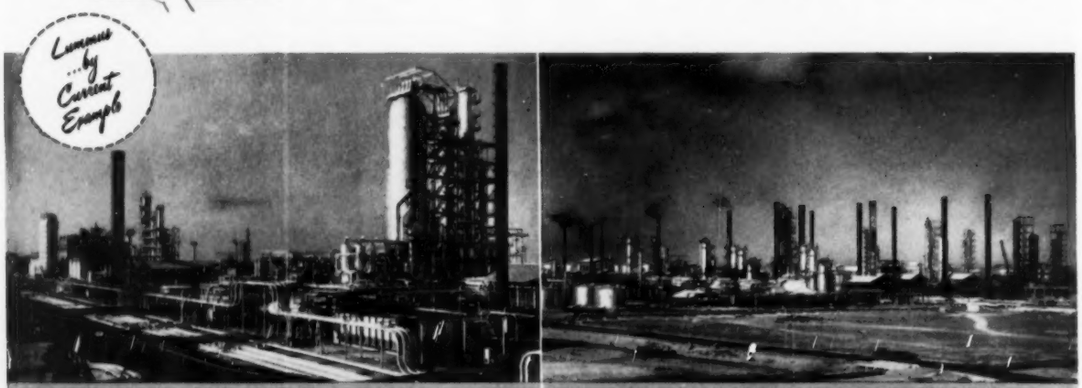

COMPLETE REFINERY IN FRANCE. This is a partial view of Société Générale des Huiles de Pétrole's complete oil refinery at Dunkirk which alone makes available about 1¾ million gallons per day of a full range of petroleum products for French industrial and domestic uses. Practically all processing units in this refinery were designed, engineered and built by Lummus.

COMPLETE REFINERY IN VENEZUELA—a project in which Lummus played a major role by designing and engineering most of the processing units, and constructing all of them. Covering 3,150 acres, this refinery handles 170,000 barrels per day of petroleum—almost one-half of Venezuela's total refining capacity. Owners Shell Caribbean Petroleum Company.

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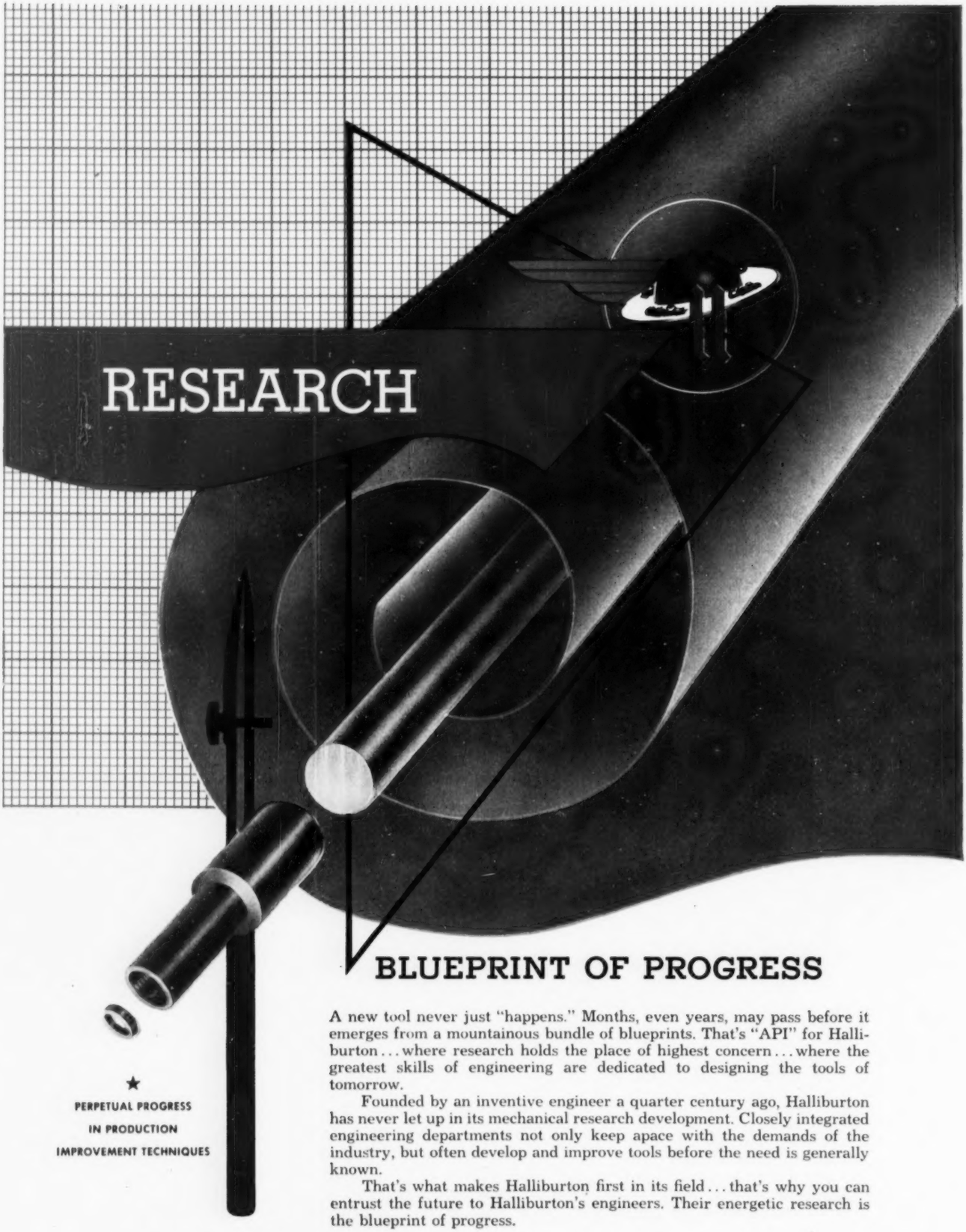
THIS MONTH'S COVER

This color photograph by Elwood Payne of Houston, Texas, shows a portion of the interior of a Texas Eastern Transmission Corp. natural gas centrifugal compressor station at Newton, Texas. Along Texas Eastern's more than 4,200 miles of pipe lines, when the present expansion program is completed, there will be 22 centrifugal compressor stations and 16 reciprocating stations with combined installed horsepower totaling 346,850. Color plates are reproduced through the courtesy of Jack Clarke, director of public relations for Texas Eastern.

In the January issue of WORLD PETROLEUM, the photographs of the Dunkirk refinery of Societe Generale des Huiles de Petrole which was described on pages 44 to 48 were taken by Mr. Payne and reproduced through the courtesy of the Lummus Company. Unfortunately, the credit lines on these photographs were omitted.



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A SORRY CHAPTER IN A SORDID EPISODE

WHILE THE LEGAL DEPARTMENT of the federal government has at times employed surprising tactics in its assaults on American business, particularly the variety that is referred to by its attackers as "Big Business," the most high-handed attempt to require such concerns to assist in their own conviction was unveiled in Washington during the past month. Except for the absence of physical and mental torture, it smacked unpleasantly of methods made familiar behind the Iron Curtain.

In this instance, however, the move to induce reputable and law abiding citizens to accept the brand of transgressors apparently did not originate with the law enforcement agency of the government. The order to the Attorney General came direct from President Truman and was released from the White House after having been decided upon at a secret meeting of the National Security Council of which the Chief Executive is chairman. In his directive, the President said that as a result of factors "which have emerged since the institution of the current investigation," he was convinced that the interests of national security would best be served by substituting civil action for the pending criminal proceeding, but only if the accused companies would agree to the production of the records demanded under grand jury subpoenas.

The manner in which this apparent change of attitude was made known to the representatives of the defendant companies was probably without precedent. They were summoned to appear at the Department of Justice and were given until the following morning to decide whether they would accept a skeleton bill of complaint binding them to produce all the records previously demanded of them. They were told also that the agreement must be unanimous or the proposal would be withdrawn. To the comment from one of those present that this seemed very like holding a gun to their heads, the reply was, "There it is, cold turkey; take it or leave it."

Anti-trust suits on occasion have been amended from criminal to civil status, followed by a "compromise" in which the defendant agreed to "desist" from the practices with which he was charged. Some companies have accepted such settlements rather than risk added reprisals and to save expense, delay and disruption of their operations. For the oil companies, such a course was impossible without the sacrifice of principle, since they have denied in the most vigorous fashion engaging in any of the monopolistic practices of which they were accused. From a strictly legal aspect, there was a bit of sharp practice in the proffered deal since dismissal of criminal charges was made dependent on the companies' putting in the government's hands an added weapon which would not be available in an ordinary civil suit.

The President's belated discovery that the government's attempt to make criminals of the men directing leading American companies was harmful to national security is one of the most astonishing developments in the whole situation. As is well known, the report on which action against the oil companies was based was kept top secret for almost a year, reportedly on the insistence of the State Department that its publication would have precisely the effect now acknowledged. It was only when the political straits of the Truman administration created an imagined need for some cheap political capital that advance reports of sensational charges began to leak out, followed by release of the full report during the later stages of the presidential campaign.

The damage to the interests of American oil companies, and likewise to the standing and prestige of the United States in other parts of the world, was assured of reaching maximum proportions by the manner in which public anticipation was whetted by advance hints and by the sweeping nature of the charges put forth in the alleged "factual" report of the Federal Trade Commission. All this provided a glorious opportunity of which full advantage has been taken by communist and other anti-American propagandists.

The entire campaign against the international oil companies has been suspect from its start as a manifestation of political demagoguery at its lowest level. The latest development is widely interpreted as a last-minute attempt to establish a claim to at least a partial victory in the drive to discredit American enterprise.

WASHINGTON DATE LINE

Cartel Suit Fiasco May Revise Government Methods

OUT OF THE TURMOIL raised by the federal government's attempt to obtain the criminal indictment of major oil companies on the charge of participating in an international cartel constituting a virtual monopoly may come a better method of handling cases that involve national security or the position of American companies operating abroad.

The idea, far from new, which is being informally discussed among lawyers, government officials and businessmen, is the introduction of some method by which a business organization, not necessarily an oil company, but any firm or corporation, can obtain an advance opinion from the Department of Justice as to whether a proposed course of action is in accordance with or in violation of the statutes of the United States. It is realized of course that no government agency can or should render a grant of immunity, but a non-binding opinion based on a specific statement of facts might be a useful guide to a company, especially one engaged in foreign business.

A companion proposal is that in cases involving relations with other governments or affecting the national security, consultation should be had with the State Department which would be in a position through its Washington organization, or through advice from its representatives abroad, to render helpful cooperation on this delicate but highly important point. A suggestion of such a procedure was contained in Judge Kirkland's comments in his decision rendered on January 13 in which he said that in case the incoming administration decided to continue the action, he would rely heavily on the advice of Under Secretary of State Walter Bedell Smith as to the effect of disclosure of some of the documents in dispute upon the national security.

Over a period of years, many corporations have sought the opinion of the Justice Department as to whether certain proposed lines of action would be held to contravene anti-trust regulations, but the Department invariably has refused to entertain any such proposal. Its position has been one of "decide for yourself and take the consequences."

Meanwhile, the decision as to future procedure so far as the government is concerned has been virtually handed over to the Eisenhower administration by the decision of Federal District Judge James R. Kirkland, postponing to January 28 the deadline on which five major companies must deliver to the federal grand jury here the vast array of documents which they have been commanded to produce. In explaining this decision Judge Kirkland said: "We are now in the advanced stages of this criminal case and it's up to the government to either fish or cut bait, continue or dismiss the suit."

Two weeks delay, he explained, would give the outgoing administration time to make up its mind as to what it wanted to do and would enable its successor to decide whether it wanted to do anything or not. The judge denied motions submitted by oil company lawyers asking that the criminal phase of the suit be quashed and delivered a homily in which he referred to the "apparent lack of harmony among the executive branches of the government" and at the same time warned the companies against defiance of orders of the court, pointing out that the record was now clear of all matters except the orders to deliver their domestic records on January 28 and to show by March 2 that they had endeavored in good faith to get consent from abroad for production by March 18 of foreign-held documents pertaining to the case.

The latest explosion in the case was precipitated by action taken at a secret session of the National Security Council on January 9 which was revealed when Attorney General McGranery produced a letter from President Truman, chairman of the council, which read: "I am of the opinion that the interest of national security might be best served at this time by resolving the important questions of law and policy involved in that (oil) investigation in the context of civil litigation rather than in the context of a criminal proceeding.

"However, I believe that this would be the case only if the companies involved agreed to the production of documentary material which the companies are required to produce under an existing order of court based on grand jury subpoenas.

"Consequently, I ask that you promptly confer with representatives of the companies to ascertain if they will agree to enter into a stipulation to that effect. If they will, I ask that a civil proceeding be instituted accordingly and that appropriate steps be taken to cause the termination of the pending grand jury proceeding."

What happened during the 80-minute meeting to which oil company representatives were summoned to receive this offer was told by excited, angry lawyers who described the proposal as a "disgrace," "an insult" and "attempted blackmail" on the part of the government. The Attorney General refused to answer questions or talk with reporters.

"The Attorney General came in grim, in an angry mood, glared at us and told us to sit down," Arthur H. Dean, representing Jersey Standard, said later.

"He said he would not answer questions regarding the proffered deal, but said that he was making a proposition, giving us overnight to make up our minds, that all the companies must accept it, that it was 'cold turkey, take it or leave it.'"

This was the proposal, said the attorneys:

(1) The government would drop the criminal action before the federal grand jury and substitute a civil suit covering the same charges with a proviso.

(2) The oil companies must give up all the records asked in the criminal proceeding, except those overseas which might be asked later; the oil companies must refrain from seeking to amend or strike out the government's civil motion for 60 days after the last documents had been given up; the government's first outline of its civil action would be a "skeleton" one, with details to come later.

"In effect," said Mr. Dean, "the Attorney General asked us all to give him a blank check for the government to go ahead with a civil suit, a suit during which the government would have the right to amend, but we would be tied hand and foot. It was outrageous blackmail.

"We (Jersey Standard) made a flat, curt rejection. We said we wanted no part of it and we rejected the offer in its entirety." Representatives of the other companies took the same position.

While the Attorney General said he had no comment to make, his spokesman warned that the government was going to try to press right ahead with the criminal action until forced to do otherwise.

From the viewpoint of the oil company representatives, they were being asked to sign, at gunpoint so to speak, a document that would permit government prosecutors to fill in not only the original charges, but any elaboration that might occur to them as feasible from a study of the subpoenaed papers. While the suggestion was advanced in legal quarters that limitation of the attack to a civil action would pave the way to a compromise and a "consent decree" by which the defendants would agree without penalty to desist from the alleged practices, this was entirely unacceptable to the oil companies. All of the companies have denied vehemently that they are engaged or ever have engaged in any of the monopolistic activities of which they are accused; any such acknowledgement as proposed for the sake of avoiding further prosecution would involve a sacrifice of principle, while the damage to the companies abroad and the injury to the standing of the United States already had been done through world-wide circulation of charges that their own government was trying to brand them criminals.

In capital circles, where everything is judged by its possible political effect, the opinion has long been held that the attack on the oil companies, brought in the heat of a presidential campaign, was inspired by a hope of providing some partisan advantage to the administration. Having failed completely of this purpose, the President's letter was interpreted as a last-minute effort to establish a claim to at least a partial victory over the oil companies. As these observers see it, the much-touted "cartel" began to disintegrate with the November election and finally fell apart when the attempted "squeeze play" by the outgoing administration was stopped.

By Joseph Huttlinger

Urge Higher U. S. Crude Level

OFFICIALS CHARGED with defense planning are seriously concerned about the state of the nation's oil reserves, more particularly reserves of crude. A top of a million barrels of potential daily production which now is little more than 15 percent of current domestic supply is, in their opinion, not sufficient in case of war or even to meet the threat of war emergency.

The reserve is "much too small," says J. Ed Warren, deputy petroleum administrator, who is a practical oil producer from Texas. Admittedly, the two year expansion in drilling activity which followed the start of the Korean War has helped the situation existing at that time, but it is not enough. That is the burden of comment in official defense circles. New programs to justify and encourage further expansion are held to be needed. Steps proposed for consideration include the following:

(1) Government loans against future oil discoveries.

(2) Government purchase of crude oil reserves in place, just as minerals are purchased and stockpiled above ground.

(3) A "setaside" in the tidelands for military oil reserves, once the Congress passes legislation enabling tidelands development to go ahead.

(4) Wider well-spacing and slower withdrawals.

(5) More oil imports to save domestic reserves.

Any or all of these suggestions are likely to rouse opposition from one segment or another of the oil industry. The idea of conserving domestic supplies by increasing imports is certain to lead to a political fight. With imports near an all time high, around a million barrels a day, the coal industry and some independent oil producers are moving to have this influx cut down through higher tariff rates or the establishment of quotas and will be arguing their case before Congress at the session now beginning.

The relationship between petroleum imports and domestic reserve capacity has been a subject of argument for many years. It has been pointed out that one way to build up a reserve quickly is to shut in some production and import oil instead. The Pratt report to the National Security Resources Board some years ago suggested this among other steps. Yet, this creates as well as solves problems. Oil economists point out that a large volume of petroleum imports along with a large reserve capacity at home could tend to wipe out incentives to drill for more petroleum.

The long range effect, thus, could be to make the nation dependent upon imports while domestic development slowed down, unless some form of recompense for creating unused reserve can be devised. National Security planners are aware, further, that petroleum imports may be vulnerable in time of war to enemy attack. The import question, thus, has two sides.

The sparkplug behind the "more-reserves" drive has been the Petroleum Administration for Defense. One of its first announced aims was to build up a reserve of a million barrels daily. This has been done, but still more is needed, according to Deputy Administrator Warren, who gave his views in a startlingly frank talk to oil men recently. "Certainly the industry has increased capacity over the past several years," he said. "The unfortunate thing from a defense standpoint is that it hasn't increased it enough." Warren wondered whether the normal economic incentives are sufficient. If the job of getting more reserve isn't done, he warned flatly, "the government will move in and start dictating." About the same time, Secretary of the Interior Oscar L. Chapman foresaw the need for "some new incentives."

PAD concern continues despite a later statement from Charles J. Hedlund, director of the agency's program division, which, while reiterating the need for larger crude reserves, pointed out that increased flexibility had been imparted to the industry by the rise in refining capacity and in pipe line facilities. Of course, there are limits to the amount of reserve the industry can carry under sound economics," Mr. Hedlund said in mid-January. All the agency wants from the industry, he said, is "the maximum

(Please turn to page 62)

MOOSE JAW

Unusual product requirements of British American refinery in Western Canada created interesting engineering design problems

By C. F. Tears and
C. Frederick Tears, Jr.*

THE PROCESS and mechanical engineering design of the extension to the British American Oil Company Limited's Moose Jaw, Saskatchewan, refinery was a most interesting problem. The geographical location with its effect on the product requirements, the product specifications, the utilities and mechanical details gave rise to unusual problems not frequently met in design assignments of this kind. The development of the problems resulted in a unique refinery installation.

The existing Moose Jaw refinery was originally built in 1934 when it was completed as a simple combination topping and thermal cracking installation. It was extended in 1943 by the addition of a vacuum unit for the production of asphalt. In 1950 the owners decided to extend it again to supply all refined product demands for the surrounding area. At that time the refinery was operating at a charge rate of 6,000 b/d of crude in a conventional topping, vacuum reduction and thermal cracking operation.

During most of its early life the refinery operated on crude imported into Canada from long distances at a tremendous disadvantage in transportation costs for crude. The development of the Alberta oil fields and the completion of the Interprovincial Pipe Line for transporting the Alberta crudes to the East immediately resulted in a domestic supply of crude oil for the refinery. The Interprovincial Pipe Line passes Moose Jaw at a point approximately 22 miles east and a branch line was installed for transporting the crude oil from that point to the refinery.

The refinery was expanded to a design crude capacity of 10,000 b/d with a comparatively large increase in catalytic cracking capacity as required for a relatively high octane level for all gasoline produced. The refinery was designed fundamentally for operation on Redwater crude.

A survey of the product requirements for the area to be served by the refinery was prepared by British American and as indicated earlier this statement of product requirements immediately gave rise to interesting process problems. The product requirements indicated the following:

(1) The octane level of all gasoline to be produced was relatively high, 86 research octane for regular gasoline and 89 research octane for the premium grade.

(2) Specialty products in the way of lighting naphtha, cleaning naphtha and asphalt cutback were required but only to the average production of 86 b/d or less than one percent of the rated crude charge capacity.

(3) The finished kerosine demand for that area was only 70 b/d while the normal crude topping operation produced some 1,100 b/d.

(4) There was a demand for 530 b/d of tractor fuel.

(5) The demand for diesel fuel was relatively high at 1,025 b/d.

(6) The requirement for asphalt was 300 b/d while the normal topping and vacuum reduction yield was 1,420 b/d.

(7) The total market requirement for heavy fuel oil or Bunker "C" was 12 b/d.

A laboratory break-up on Redwater crude showed the expected topping yields as follows:

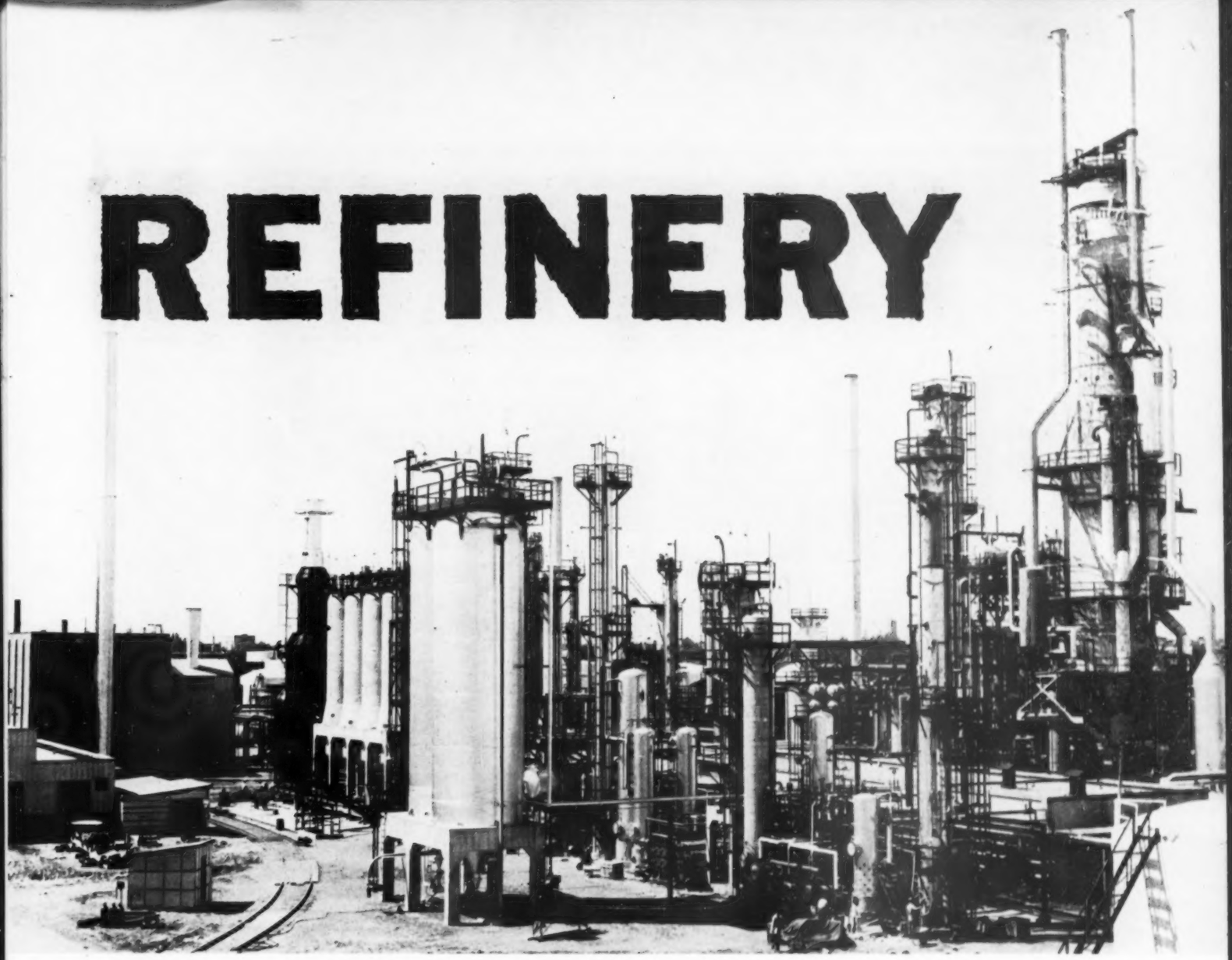
	Percent
Gasoline, 400 end point	32.1
Kerosine	11.2
Combined Light Distillates	18.9
Vacuum Distillate	21.1
Asphalt	14.2
Loss	2.5
Total	100.0

Comparison of these expected topping yields with the product requirements developed the following:

(1) The expected demand for kerosine was only 6.4 percent of the total potential production.

* President and Vice President of Tears Engineers, Dallas, Texas.

REFINERY



General view from the southeast of the new processing units. Left to right: coking heater and drums, catalyst storage hoppers, gas concentration unit and polymerization unit, fluid catalytic cracker.

(2) The market requirements for light distillates of all types was only approximately 82.4 percent of the total production from the crude topping operation only.

(3) The market requirement for asphalt was only 21.4 percent of the potential production.

(4) There was no demand for conventional No. 2 Fuel Oil or domestic fuel.

(5) The demand for heavy fuel oil or bunker fuel was practically nil.

The foregoing statements set up a fundamental processing problem which to a conventional refiner would appear at first glance most difficult of solution. The solution was accomplished with the cooperation and able assistance of British American's engineering department.

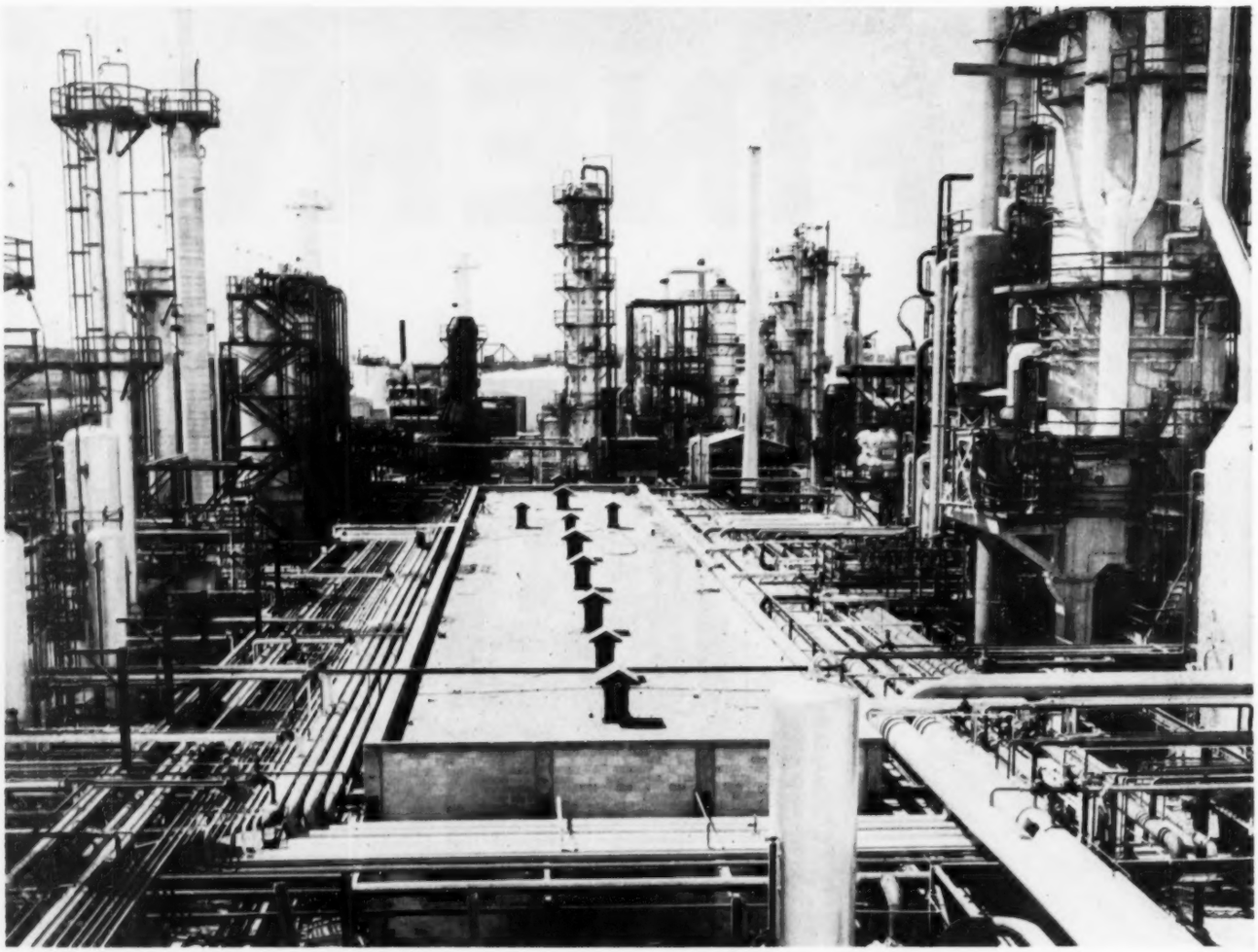
In addition to the problems indicated on the processing there was also a major problem on the utility system. The existing refinery is located on Moose Jaw Creek, which is named a creek largely by courtesy only. It is a running stream only during the spring thaws. During the spring thaw, water is impounded behind a dam from which it is continuously circulated for the balance of the year through a cooling tower system and back to the pond. The same pond also serves as the source of cooling water for the local power company. There is no make-up to the pond except during the spring thaw. The entire steam requirement for the existing refinery was purchased from the local power company and no steam generation was done in the refinery although the refinery did have a stand-by boiler installation. The electric power also was purchased from the local power company.

In order to extend the water storage capacity as required for the expansion of the refinery, a second dam was installed down stream from the original dam providing water storage of approximately twice the volume originally provided. Further, in order to insure a source of make-up water into the storage system during the dry season, the effluent from the Moose Jaw city sewage system was clarified and purified and directed into the second water storage pond.

Added to these peculiarities, largely attributable to the geographic location of the refinery, was another geographic difficulty in that atmospheric temperatures during the winter were as low as minus 50° F. and the frost line was 7 feet below grade.

Surprisingly, there was underlying the entire refinery area a layer of water-bearing quicksand which necessitated piling all of the major foundations. Franki type compressed concrete piles were used throughout and many of these were driven under extremely adverse weather conditions.

A complication that did not appear in the early consideration of the processing



Centralized pump and control house for the new processing units, viewed from the east. Left to right: gas concentration unit, coking drums, coking and thermal cracking heaters, coking unit fractionating tower (rear center), three-stage crude distillation unit (right rear, vacuum stage, atmospheric stage, crude stabilizer), fluid catalytic cracker (right foreground).

problem was the fact that final analysis of the Redwater crude showed a relatively high percentage of propane and butane, i.e. 2.5 percent. This gave rise to the consideration of a crude stabilizer which was installed as the first unit in the crude distillation area. This served to separate out the hydrogen sulfide content of the crude as well as the propane and butane. The propane and butane mixture was directed to the gas concentration unit for final rectification.

The crude also had a relatively high content of water and salt which involved installation of a Petreco desalting unit of the conventional type using a spheroid for the settling zone.

Heat requirements for both the desalter and the crude stabilizer were supplied largely by heat exchange on the crude unit, but a direct fired reboiler was installed for the stabilizer.

The existing thermal cracking heater was converted to use as the crude heater for the crude topping unit. Except for this heater and an existing vacuum unit heater of the box type, all heaters in the installation were of the Petrochem combination radiant and convection type with vertical tubes for both the radiant and convection sections.

The crude distillation is accomplished in two stages in an atmospheric unit and a vacuum unit. The atmospheric unit is a conventional single flash, single tower unit with side stream strippers and is designed for separation and fractionation of all products from the crude through light gas oil. A new atmospheric crude flash tower and auxiliaries was installed in connection with the existing thermal cracking heater which was rearranged for crude distillation service.

The existing vacuum unit was used for the vacuum distillation section of the crude unit practically without change except for the addition of heat exchange and condenser surface. It was arranged for blocked out operation to produce either penetration asphalt with all heavy gas oil going overhead to catalytic cracking unit charging stock or a 25 percent crude residuum for charge to a coking unit.

The stipulation in the product requirements that there was little or no demand for heavy fuel oil necessitated the installation of a coking unit. The type selected was a conventional coking unit designed for coking the entire production of 25 percent crude residuum. Note that the charge contains 56 percent of 70 penetration asphalt. As noted elsewhere, the heater for this coking unit was a vertical tube Petrochem type which is one of a few installations of this type of heater in coking service. The coking unit is provided with four 10 x 40-foot coke drums for production of coke at a design rate of 84 tons per day. The coke chamber cleaning device is of the Hughes type as furnished by Forsythe Engineering Co. The hydraulic type of coke removal installation was given serious consideration but was finally ruled out in view of the larger quantities of water involved in its operation because of the extremely cold winter conditions and the scarcity of water for the cleaning operation.

The complete lack of market for No. 2 fuel oil or domestic fuel oil and the very limited demand for kerosine forced

the installation of a thermal cracking unit for charging the light cycle stock from the catalytic cracking unit and the excess production of kerosine from the crude unit. The thermal cracking unit was combined with the coking unit by discharging the thermal cracking heater outlet in the transfer line of the coking unit. Thus, the investment in the thermal cracking unit was reduced practically to the cost of the heater and charging pump only. The fractionating tower and its various accessories and controls were common to the coking unit and the thermal cracking unit. Incidentally, the fractionating tower for this combined unit came from the existing thermal cracking unit in the original refinery.

After an exhaustive study of the units available, a Universal Oil Products Company fluid catalytic cracking unit was selected for this installation. The unit is designed for a fresh charge capacity of 4,414 b/d, for a conversion rate of 80 percent and a cycle ratio of 1:1. The rated coke burning capacity is 7,200 lbs./hr.

As is obvious from the over-all description of the catalytic cracking unit, the basis for design anticipates cracking nearly to extinction with minimum yields of light and heavy cycle stock. It was, of course, obligatory that the yields of these two grades of cycle stock be reduced to the practical minimum because of market limitations mentioned earlier; namely, the definite lack of market for No. 2 fuel oil and for bunker "C" fuel oil, the only normal outlets for these two products.

The fresh charge to the catalytic cracking unit is light gas oil from the crude unit, heavy gas oil from the vacuum unit, and coker gas oil from the coking unit. When the vacuum unit is running for asphalt production the heavy gas oil from it represents that portion of the crude oil from 49 percent to 86 percent. When the vacuum unit is running to coker charging stock the heavy gas oil represents only 26 percent of the crude, from 49 percent to 75 percent.

The charge to the coking unit is always reduced crude representing a 25 percent crude residue for that time that the vacuum unit is not running to asphalt. As is quite obvious, the coker gas oil mixed with the fresh charge to the catalytic cracking unit is not the most desirable charging stock because of its having been partially cracked in the coking unit. Also it contains the heavier ends of the thermal cracking cycle stock. It is probably equivalent to a first round cycle stock.

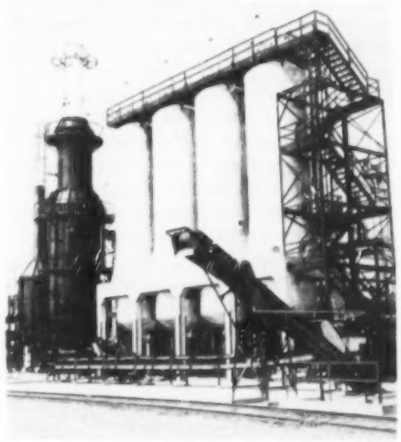
The design basis for the catalytic cracking unit anticipated a production of light cycle stock of 618 b/sd or 6.18 percent of the original crude charge. The combined heavy cycle stock and clarified residue represents a total of 265 b/sd or 2.65 percent of the crude. It is interesting to note that this latter volume is the entire production of heavy fuel oil from the total crude charge.

The over-all yields from the catalytic cracking unit used as the design basis were:

Product	Percent Volume	Percent Weight
Gas	—	10.38
Total Butanes	19.50	12.90
Debutanized Gasoline	51.30	43.55
Light Cycle Oil	14.00	14.35
Heavy Cycle Oil	1.50	1.38
Clarified Residue	4.50	5.15
Coke	—	12.29
Total Liquid Yield	90.80	—
Total		100.00

The non-condensable gas was directed to a gas concentration section designed for optimum recovery of propanes and butanes with the total C_3 and C_4 recovered mixture charged to a conventional chamber type UOP catalytic polymerization unit for the production of stable poly gasoline.

The gas concentration unit handled all gas from the catalytic cracking unit, the coking and thermal cracking unit and the crude stabilizer overhead. The gas concentration unit was designed for a minimum recovery of 70 percent of the propanes content and 95 percent of the butanes content. The total design recovery of poly gasoline from this recovered mixture was 436 b/d of which less than 10 percent originated from the coking and thermal cracking unit. Thus, the catalytic cracking unit produced approximately 400 b/d of poly gasoline which represents 9.1 percent of the fresh charge to the unit. When this is added to the yield of debutanized gasoline from the catalytic cracking unit itself the total gasoline yield from the catalytic cracking operation is 60.4 percent (Vol.) of the original fresh charge and 26.7 percent of the original crude charge. Obviously this gasoline product is at a high octane level and in the same octane bracket may be added 604 barrels of butane produced from the catalytic polymerization and crude stabilization units which can enter the gasoline blends at the Reid vapor pressures specified. This brings the total yield of high octane product to 3,310 b/d or 33.1 percent of the crude and 51.0 percent of the total gasoline produced. The net result in the gasoline blends is that the total production of first grade gasoline at 89 research octane number and second grade gasoline at 86 research octane number is produced with an average of 0.88 cc TEL per gallon.



Closeup of the coking heater and coking drums, viewed from the southeast. Mechanical de-coking with a rising rotary drill is used, with direct loading of the coke into railroad cars by means of the conveyor system in the foreground.

The combined total gasoline yield is 64.85 percent of the original crude including gasoline from crude topping, coking, thermal cracking, catalytic cracking and catalytic polymerization and including the butane used in final blends. There was no excess butane produced.

The catalytic polymerization unit includes means for producing and storing commercial grade propane for marketing as domestic fuel. Means are also provided for producing and storing the total production of mixed butanes for eventual disposal in the finished gasoline blends. As noted earlier the combined operation on a year around basis produced no excess butanes beyond the amounts used in the gasoline blends to bring the Reid vapor pressure of the blends to the specified limits.

Total production of final gasoline blends of various grades from the combined operation on 10,000 b/d of Redwater crude was 6,485 b/d (64.85 percent of crude) distributed as follows:

Product	Research Octane	Barrels Daily	Percent Total
First Grade	89.0	2,590	39.9
Second Grade	86.0	2,510	38.7
Third Grade	60.0 (Clear)	1,355	20.9
Lighting Naphtha	No octane requirement	30	.5
		6,485	100.0

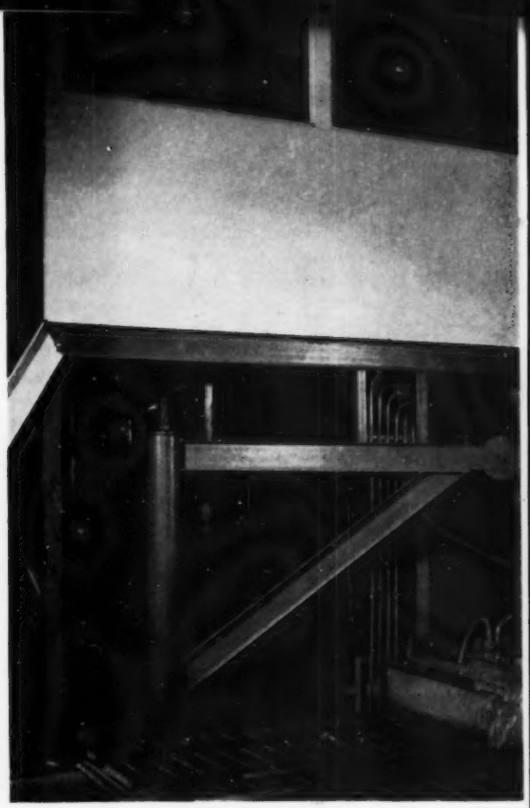
Not included in the tabulation above are crude gasoline and crude naphthas in the gasoline distillation range to the total amount of 270 b/d used in a tractor fuel blend and for asphalt cut-back. Addition of this amount brings the total gasoline yield to 6,755 b/d or 67.55 percent of the initial crude charge.

The total yield of so-called "White Products," i.e. from liquid propane through the diesel fuel product, was 8,416 b/d or 84.16 percent of the original crude charge.

The gasoline product was finished by conventional copper chloride treating in revamped existing treating units.

The complete installation is of the "combination" unit type, with continuous flow of hot stocks and intermediate stocks from one operation to the next in line and with complete integration of controls and auxiliary facilities. All major new units, catalytic cracking, coking, thermal cracking, gas concentration and catalytic polymerization are grouped around a central pump and control house as shown in the accompanying photographs.

Drilling bit pilot plant



Full scale testing of rock bits is accomplished under controlled conditions with visual as well as instrument observation.

RESEARCH IN THE FIELD of entirely new methods of drilling and in the more routine job of improving present-day bits has been facilitated for Hughes Tool Co. by the erection of a new laboratory building adjacent to the company's main offices and plant at Houston. The new laboratories permit a substantial enlargement of a program of study which has been continuous since its inauguration by Howard R. Hughes, Sr., nearly 43 years ago. Reinstalled in the new laboratories is the drilling rig first used for rock bit research in 1910. Near it rises a modern 118-foot derrick with a ground-level "cellar."

Hughes executives consider the laboratory as a pilot plant in which new ideas are tested and proved before field application. Formation test blocks of all degrees of hardness and composition are drilled under conditions which permit visual examination as well as accurate measurement and control. Whether it be a new bit facing, a new metallurgical formula for bearings or an entirely new bit of the rotary percussion type, the research workers are able to drill under adequately simulated well bore conditions.

In addition to the development of new bits and methods, the Hughes laboratories assist in normal production through the control testing of commercial bits. The laboratory is actually a division of the metallurgical department. Laboratory director is W. R. White. Departments are: research engineering under the supervision of F. L. Scott, product engineering under L. L. Payne, and metallurgical engineering under R. W. Schumpf. The laboratory organization is divided into five groups to handle specific types of work.

The laboratory building is a brick and stone structure, 325 feet long and 120 feet deep, with a two-story center section. The total floor area is approximately 60,000 sq. ft.

Excessive vibration from some of the heavy testing operations necessitated the use of special measures in the structural support and framing. Seismographic studies were made to determine the vibration characteristics of such equipment at the former laboratory building. These measurements were used in developing compensatory devices and in determining the foundation requirements to prevent resonance.

Special foundation design was also applied at the various testing stations to minimize vibration. Treatment varies from simply bolting to the floor through absorbent pads to the use of floating substructure where the operation is characterized by heavy vibration or concussion conditions.

The center and west portions of the building are separated by an expansion joint and double rows of columns to avoid the undesirable effects of expansion and contraction and as insurance against the transmission of vibration.

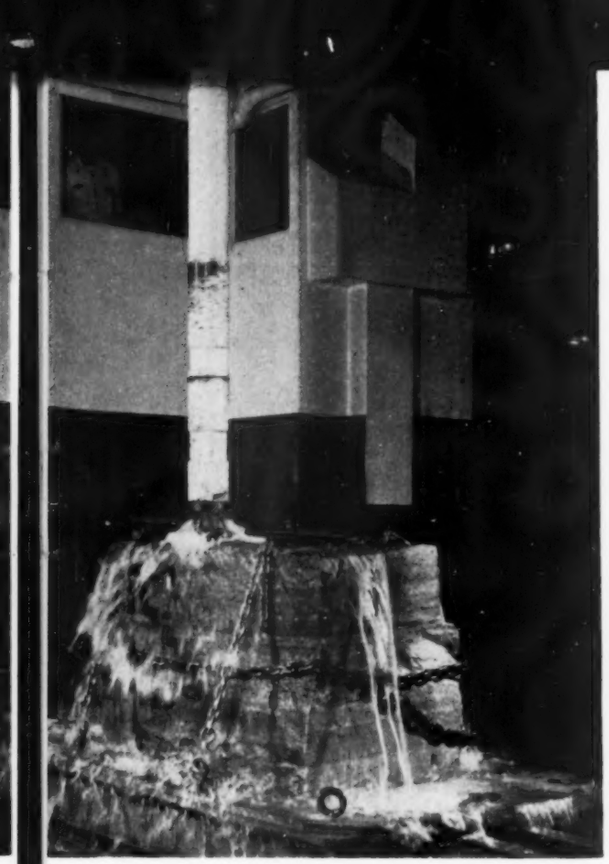
Because the shop contains many special machines and tools, particular care has been given to the control of the relative humidity in addition to the usual temperature control. The spectrochemical laboratory, for example, requires extremely close temperature and humidity tolerances. The use of a number of complete air conditioning units eliminates the movement of large volumes of air between departments in the laboratory and eliminates the possible troubles that might arise from recirculating air from chemical, welding and heat treatment sections across other areas.

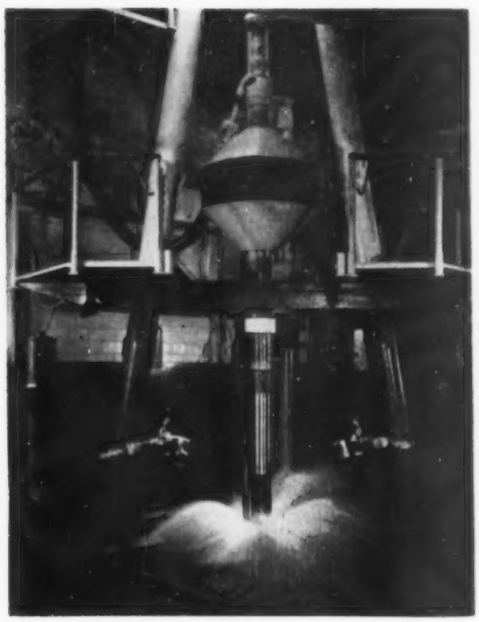
A field-size drilling rig is located within the left rear corner of the building. The framing for the rig, column footing and derrick foundation are isolated from the main building frame and foundation. Separation continues through the foundation, grade-beams, walls, structural steel frame and roof. As a result, vibration transfer is prevented during drilling.

The 118-foot derrick rises approximately 90 feet above the roof of the building. The substructure, or cellar, is located at ground level about 15 feet beneath the rotary or working floor of the derrick, which, in this case, is the ceiling of the laboratory. This area serves as the laboratory work room in which drilling actually takes place, and in which the operator is able to observe and measure the performance of bits undergoing tests. Drilling is controlled from a booth about midway between the ceiling of the laboratory and the cellar floor.

Variable drilling loads as high as 100,000 pounds can be applied by a hydraulic pulldown yoke attached to the drill stem just above the rotary table, located between the ceiling of the laboratory and roof of the building. Rotational speeds up

Entrance to new Hughes research center in Houston, Texas.





Experimental test section working on fluid-actuated percussion type bit.

to 400 rpm can be used in drilling tests.

The drilling laboratory is the preliminary proving ground for all new bit designs, materials and metallurgical processes. Test blocks of rock used in these tests are taken from many areas throughout the country and are selected to approximate the drillability of formations encountered in the various oil fields. In some instances, these test blocks are made synthetically to approximate a specific formation.

The drilling laboratory is equipped to test new drilling techniques as well as new tools. One such piece of equipment is being used in developing rotary-type, fluid-actuated percussion drilling tools and bits.

Another specialized set-up permits the jetting action of jet bits to be studied.

A microbit, 1¼ inches in diameter, is used by Hughes engineers to drill cores and rock samples from areas in which adequate data concerning performance of standard-size bits is lacking. The performance of the microbit in these cores and rock samples makes it possible to estimate the performance of full-size bits in the same type of rock formation. The microbit drilling tests also provide an excellent basis for picking the proper type of bit to be used in specific formations and in recommending the operating conditions that will give the best results.

The majority of the rock bits and other tools that undergo laboratory investigation are made in the laboratory machine shop. The shop is equipped to do almost any kind of machine work from making test specimens to building special testing machines. The important thing about the shop is its ability to quickly turn out newly designed products in sufficient quantities for extensive field trials. As a result, the timetable for obtaining answers regarding the effectiveness of new design changes, new materials or new metallurgical processes is shortened.

The chemical laboratory is fully equipped to handle a wide variety of analytical procedures related to metals. Among the laboratory's specialized equipment is a direct reading spectrometer, one of the most remarkable instruments of its kind in use by industry. It is capable of simultaneously determining eight elements and handling 200 samples a day. Elements can be accurately determined by this equipment in a matter of minutes where days would be required for the same analysis by other methods.

The laboratory is equipped with heat treating, carburizing and atmosphere control furnaces for use in the production of new test models and for setting up and maintaining proper controls over metallurgical operations employed in the Hughes manufacturing plant.

Induction melting units are available to produce various experimental melts of abrasion-resistant alloys and other metals.

Magnetic particle inspection equipment has been set up in the laboratory for examination of test models and regular production tools.

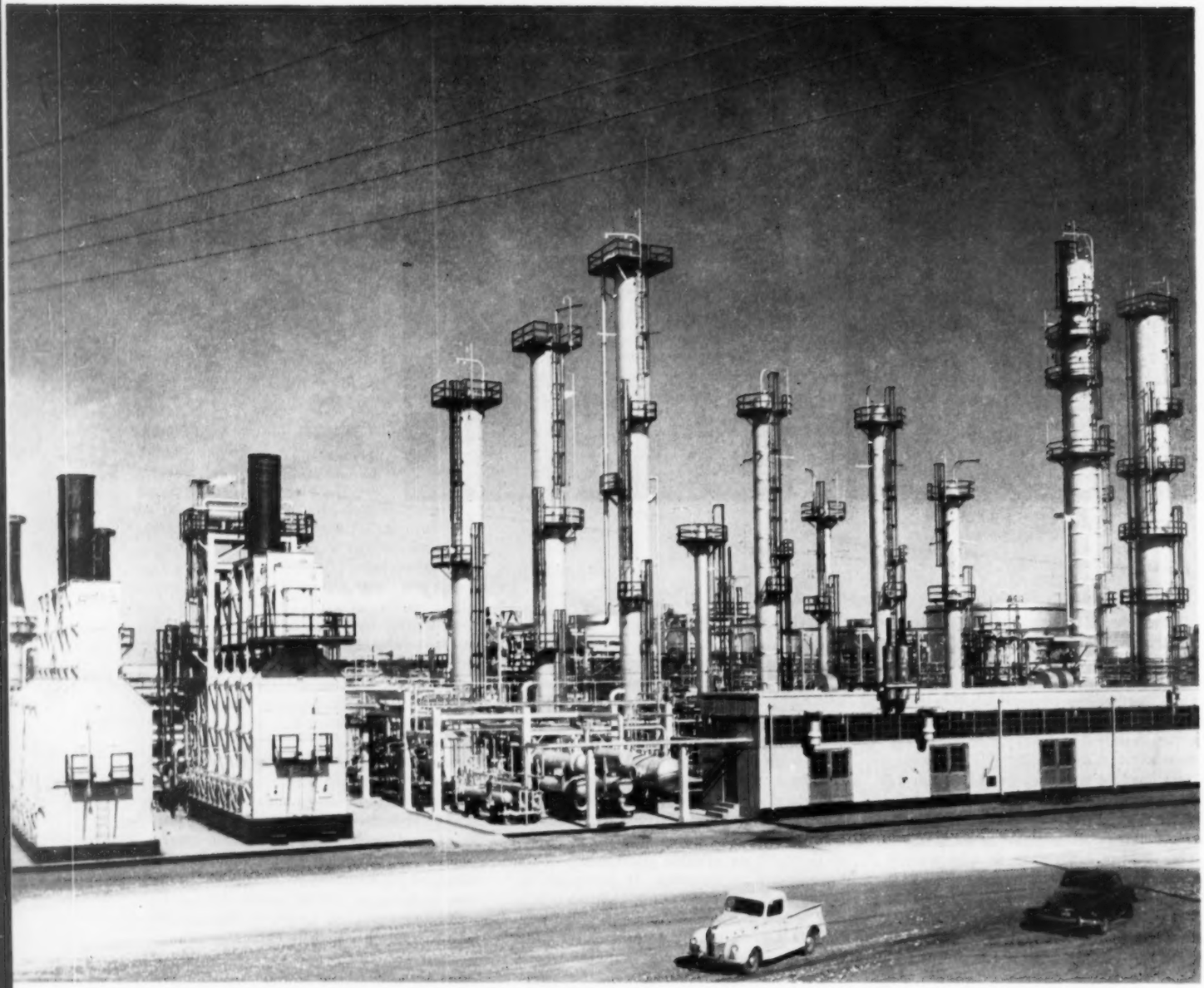
The welding laboratory is equipped to handle the hard facing and welding operations required on experimental tools, conduct investigations of new hard facing materials and techniques, and pilot the control work on materials and equipment used in shop production welding, hard facing and brazing operations. An important function of this laboratory is the development of quality standards for welding and hard facing materials and process standards for the application of these materials to Hughes products. This development work has led to the manufacturing by Hughes of all hard facing material now used in the Hughes plant.

The laboratory instruments include the latest type of hardness testers and equipment used in carrying on microstructural studies of extremely hard materials (the diamond substitute types). The laboratory also includes a unique macro-etching installation, designed by the Hughes metals group, together with extensive photographic equipment and dark room.

A high speed motion picture camera, capable of taking pictures at speeds of 3,000 frames per minute, is frequently employed in photographing rock bit drilling action.

Testing of product parts and product assemblies is the primary concern of the mechanical testing section of the laboratory and the project engineers assigned to this work. Many of the test machines used are designed by the group to approximate the conditions that will be imposed on the part or assembly in actual service.

The mechanical testing equipment includes a high capacity torque measuring machine, machines for fatigue testing full-size drill stem connections, machines to test resistance to abrasion, and designed and built to test antifriction bearings and plain bearings under variable loading and rotational speeds while being flushed with an abrasive-laden fluid to simulate drilling mud.



Overall view of Platforming-Udex units, Cosden Petroleum Corporation, Big Spring, Texas.

COSDEN HOLDS OPEN HOUSE

Refiners inspect first combination Platformer-Udex unit producing aromatics

COSDEN PETROLEUM CORPORATION was host on January 29 to a group of refiners who came to Big Spring, Texas, to inspect the company's Platformer-Udex combination unit. The unit, which went into operation on September 14 last, is the world's first combination of its type designed to produce nitration grade benzene, toluene and xylene.

The new integrated facilities include a feed preparation section, a UOP Platforming unit, a Udex unit for aromatic extraction, and a fractionation section for the separation of the Udex extract into finished aromatics.

The series of operations was carefully engineered for efficiency and economy in operation, and instrumented for the precise control required to insure the production of aromatic fractions that must continuously meet rigid specifications.

As with all projects of this magnitude, it was preceded by careful study on the part of Cosden's engineers. Although the refinery had already established a separate department to handle the manufacture and sale of specialty products, the production of aromatics represented a major step in the company's expansion program directed toward diversification of products.

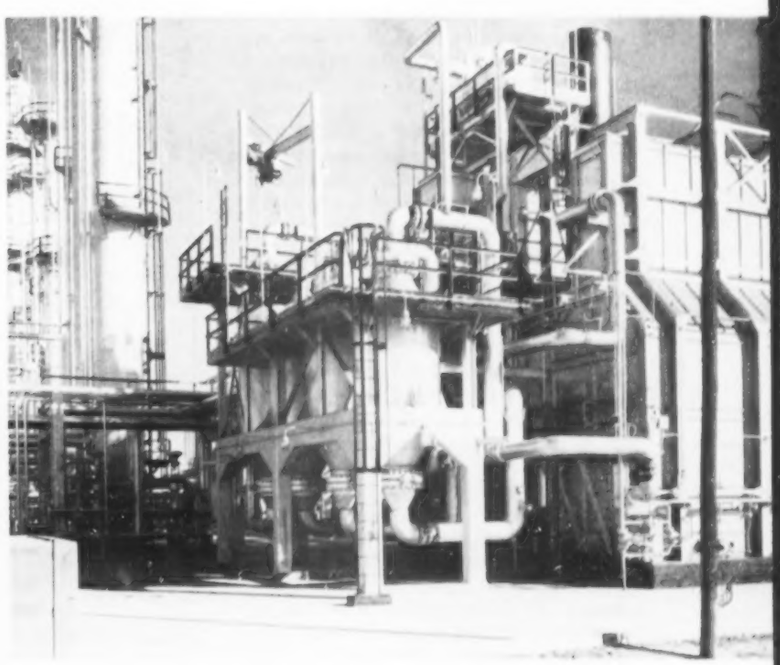
A careful survey was made of the potential market for aromatics and at the same time a detailed study was made of processes which would yield the desired products for maximum return. It was on the basis of these considerations that the decision was made to produce the three aromatics, benzene, toluene, and xylene. The study also showed clearly that if Cosden was to maintain its position of producing premium quality gasoline, serious consideration would have to be given to the upgrading of the heavy 270°F to 400°F naphtha fraction remaining after processing of the 150°F to 270°F fraction in aromatic production.

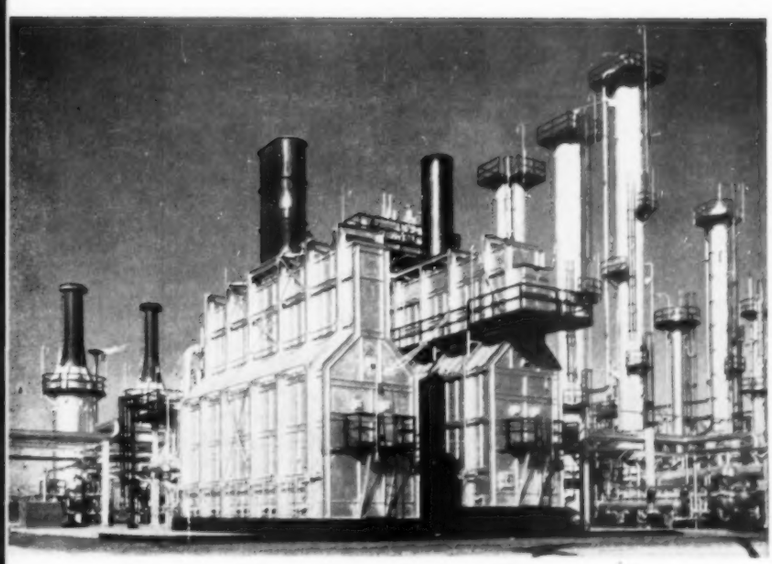
The UOP Platforming process was selected as the process best suited for the dual job of dehydrogenizing the low boiling naphthene by processing of the 150°F to 270°F fraction straight run gasoline to products with corresponding aromatics and upgrading the remaining heavy 270°F to 400°F naphtha to products of a high octane when blended to desirable volatility.

A careful study of available processes for aromatic fractions resulted in the decision to install the Udex process originated by Dow Chemical Co. and engineered and licensed by Universal Oil Products Co. Procon Incorporated, Des Plaines, Ill., was selected to handle the construction of these new units. Cosden's careful planning began to bring benefits on September 14 when the new units were placed on stream. For the relatively short period these facilities have been in operation, it has been satisfactorily demonstrated that both the predicted quantity and quality of all the specific products can be obtained continuously.

It is of interest at this point to mention that the benzene produced from the new unit is of excellent quality, that in addition to easily meeting nitration grade specifications, it also can be made to meet the rigid ASTM reagent grade benzene specification. Udex products inspection results are tabulated in Table I.

Platforming unit reactor section.





View of heater section of Cosden's new Platforming unit.

The refinery processes a mixture of West Texas crudes totaling 30,000 barrels per day. The total straight run gasoline below 400°F end point contained in the crude is first separated from the crude at the topping unit. The charge, which has a sulfur content of about 0.2 weight percent, is then processed in an existing clay treater for reduction of the sulfur content.

The first processing step in the new units is fractionation of the total straight run gasoline in a series of three towers for the purpose of preparing the individual naphtha fractions as feed for the Platforming unit and stabilizing the light fraction of the straight run. The first tower in the feed preparation section is a depentanizer taking overhead the pentane and lighter fraction which is then sent to the light straight run stabilizer for depropanization. The bottoms from the depentanizer is then pumped to a charge splitter which separates the depentanized straight run into an overhead 150°F to 270°F fraction and a bottoms 270°F to 400°F fraction. The individual fractions are sent to intermediate floating roof storage from where they are charged to the Platforming unit.

In order to meet the dual requirement of producing a high yield of aromatics and upgrading the heavy naphtha fraction for motor gasoline blending, the processing schedule was set up for a blocked-out operation on the Platforming unit.

On the alternate Platforming unit operating cycle for motor fuel production, the unit is fed with the heavy naphtha cut of 270°F to 400°F boiling range. Balancing the motor fuel operation with the aromatic operation and consuming the available naphtha, the charge to the unit during the motor fuel operation has been approximately 3,500 barrels per day. Operating conditions during the motor fuel operation have been controlled so as to produce a stabilized Platformate having a leaded F-1 octane number of 95 to 95.5. The yield of stabilized Platformate at this octane number level has been 94.5 to 95.5 volume percent of the charge.

When operating to produce aromatics for charging to the extraction unit, the Platforming unit is charged with the 150°F to 270°F prefractionated stock from storage. The processing conditions are set on the reaction section to favor maximum isomerization of the branched cyclopentanes to the corresponding cyclohexanes and dehydrogenation of the six membered ring hydrocarbons to the corresponding aromatics. The average charge rate during the aromatic operation to balance the time schedule on the block-out operation and to consume the available charge stock has been 2,000 to 2,300 barrels per day. Tests made on the charge and product from this operation have shown the yield of total aromatics to be 94.5 percent of the aromatics present in the charge or producible from the naphthenes in the charge. The high yield has been maintained from the start of operation to date during the three periods of operation for aromatics production. Products from the reactor section are depentanized in the product stabilizer and then sent to the Udex unit charge tank.

The Udex unit is operated on a continuous basis charging the aromatic product from the Platforming unit. The charge is accumulated in floating roof storage tanks to avoid contact with air. The charge rate is set to balance charge inventory and this rate to date has averaged 1,600 barrels per day. The total hydrocarbon charge is introduced at a point approximately in the middle of the extractor. The hydrocarbon rising in the extractor is contacted in countercurrent manner with a descending flow of solvent which contains diethylene glycol. The solvent in contact with the feed extracts the benzene, toluene, xylene, and whatever heavier aromatics may be present. The paraffinic hydrocarbons in the feed leave the top of the extractor as raffinate. This material is blended with the refinery gasoline product stream.

The rich solvent leaves the base of the extractor and is fed to the stripper where the aromatics are separated as a net product. The stripped solvent completes its cycle when it is returned to the top of the extractor. The aromatic extract from the stripper is next fed to a system of fractionation for separation into the individual benzene, toluene, xylene and heavier aromatic fraction.

The fractionation of the total aromatic product into the individual aromatics, each meeting nitration grade specifications, is carried out in a series of three fractionating columns, each of which is equipped with special instrumentation to precisely control fractionation, thereby avoiding the need for any additional fractionation on the individual product streams. The properties of the individual aromatics as currently produced from the unit are shown in Table I. In the case of xylene, the petroleum-derived product in general has a gravity value which is either close to the specification maximum or exceeds it, as can be seen in the xylene analysis. This is again an indication of higher purity and probably represents a somewhat greater content of ortho-xylene. The isomeric distribution of aromatics in the xylenes is as follows:

Toluene, vol. %	Less than 1
Para-xylene	18
Meta-xylene	39
Ortho-xylene	24
Ethylbenzene	19
Higher aromatics	Nil

The entire operation of the new facilities is controlled from a central control room equipped with a graphic panel depicting the flow through the successive units of the equipment. The graphic panel has a total of 64 compact strip chart recording instruments for control of the integrated operation.

Because of difficulty which has been encountered in the past with water side fouling on hot service coolers, it was decided to use two air cooled units in those services where difficulties with fouling would be expected to be troublesome. These units have given good service and their application has been well justified.

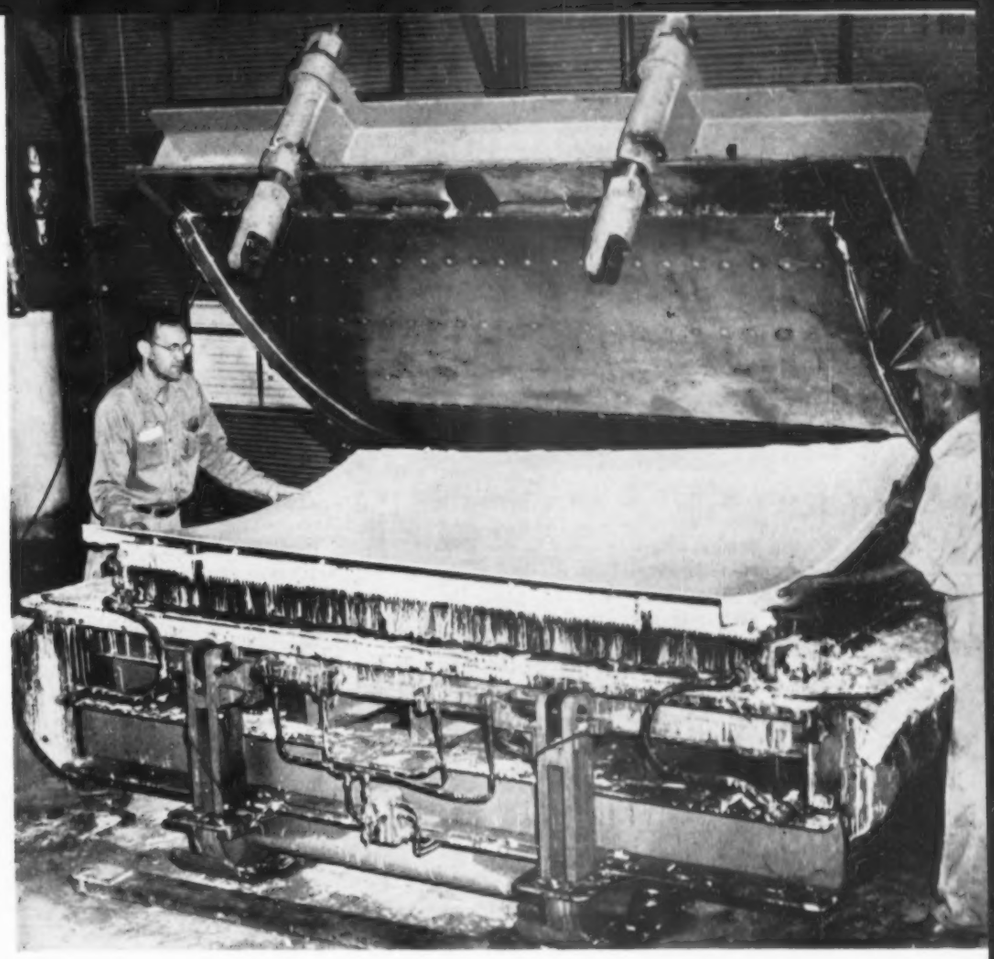
The operation of the facilities is now well integrated with the rest of the Cosden refinery which includes crude topping, fluid catalytic cracking, thermal cracking and polymerization. The trend toward diversification of products which has been started may well be continued in the future. Many interesting possibilities presently exist in opportunities for supplying the continuously expanding demands of the new petrochemical industry which is growing with amazing rapidity on a score of fronts.

TABLE I

INSPECTION OF AROMATIC PRODUCTS FROM UDEX UNIT

	Benzene ASTM Nitration Grade Specs.	Udex Product	Toluene ASTM Nitration Grade Specs.	Udex Product	Xylene ASTM Nitration Grade Specs.	Udex Product
Specific Gravity	0.8820-0.8860	0.8849	0.8690-0.8730	0.8724	0.8650-0.8700	0.8724
Color	x	Passes	x	Passes	x	Passes
Solidifying point, °C.	>4.85	5.49	—	—	—	—
Acid wash color						
Acid phase	<2	0	<2	0+	<6	0+
Hydrocarbon phase	No change	Passes	No change	Passes	No change	Passes
Acidity	No free acid	Passes	No free acid	Passes	No free acid	Passes
Sulfur compounds	Free of H_2S&SO_2	Passes	Free of H_2S&SO_2	Passes	Free of H_2S&SO_2	Passes
Sulfur, weight %	—	—	—	—	—	0.0008
Copper corrosion	xx	Passes	xx	Passes	xx	Passes
100 Ml. Distillation						
Range, °C	<1	0.6	<1	1.0	<3	2.6
Included temperature, °C	80.1	Passes	110.6±0.1	Passes	139.3	Passes
Initial boiling point		97.8		110.2		139.0
10%		80.0		110.4		139.2
50		80.1		110.8		139.8
—		—		—		—
90		80.2		111.0		140.4
End point		80.4		111.2		141.6

x Not darker than solution 0.0030 g. $K_2Cr_2O_7$ in one liter of water.
xx No iridescence or discoloration.



Molding a portion of a Fiberglas-reinforced resin oil storage tank on a stave press.

This 250-barrel tank of Fiberglas-reinforced resin weighs but a fraction as much as a steel tank of the same capacity, and is virtually impervious to damage by hydrogen sulfide, salt water, electrolytic action and other deteriorating influences from crude oil storage.

PLASTIC LEASE TANKS FOR CORROSIVE SERVICE

A NEW APPROACH to the problem of preventing corrosion in sour crude lease tankage has been made by Murdock Tank and Manufacturing Co., Tulsa. The company has developed methods of molding large sections of polyester thermosetting plastic to produce tank sections which can be assembled and bolted in the field.

The finished tanks already have proved to be economical in salt water disposal service as well as in sour crude handling. First tank manufactured by Murdock was installed on a lease in the Kiefer, Okla., district where salt water corrosion was especially severe. Previously, tanks were destroyed in a few weeks. The initial tank went into service on Sept. 1, 1952 and has shown no signs of deterioration to date. Similar results have been observed in sour crude areas.

Resins employed in manufacturing tank sections are reinforced with fiber glass for additional strength with the result that API bolted tank specifications are met. Bursting strength of the tanks is 30,000 psi vertical tensile strength and compression strength 20,000 psi. To insure adequate strength at the bolt line, the Murdock molds provide additional thickness at these points so that punching will not create a zone of weakness. All decks are manufactured with corrugations to prevent flexing. Reinforced bolt channels used in assembling tanks in the field supply adequate strength to eliminate the need for any inside deck supports.

Neoprene gaskets are used in tank erection to prevent oil leakage. It has been found that tanks stay tight in the field during extreme changes in atmospheric temperatures because of the low coefficient of expansion. This helps reduce both vapor and liquid losses.

Metal bolts are used to assemble the tanks, but Murdock engineers have developed a "non-corrode" bolt channel in which the heads of all bolts are imbedded in plastic strips. As a result, there is no metal exposed in the tank interiors.

Tests of the plastics used show that electrolysis will be no problem as the material is a non-conductor. It is not attacked chemically by weak alkalies, acids, oil, organic solvents, or salt water. Mixtures of sulfuric, nitric and muriatic acids have no effect on the tank plates.

The particular plastics used in tank fabrication have a satisfactory temperature operating range. It is reported that the tanks stand up satisfactorily in temperatures from minus 65°F to 300°F.

Weight saving in plastic tanks is great when compared with steel. This reduces freight to destination and reduces field erection time. Weight of a 500-barrel plastic tank is 1,600 pounds, of which 400 pounds is attributed to bolts, nuts and washers. A steel tank weighs 7,940 pounds. Individual plastic stave and deck segments are easily handled by one man.

The cost of plastic tanks is less than wood, but higher than steel. Currently steel lease tankage costs about $4.50 per barrel, plastic $6 and wood $8. In corrosive service, the plastic tanks pay out the cost differential in a period which will depend on the service life of steel. In non-corrosive service, payout must depend on the fact that no paint is ever required and maintenance is less costly plus possible freight savings and cheaper erection.

By G. G. Rosu

THE ROMANIAN REFINING INDUSTRY

EARLY IN 1951, the entire Romanian refining industry was handed over by the Romanian government to the Soviet economic organization in that country. By August of the same year, the taking over was completed. Since that date, the Romanian oil industry has been under a single command, that of the Soviet-Romanian joint company, Sovrompetrol.

In western legal terminology there is hardly any suitable expression which could accurately describe the present status of the Romanian refining plants. The confusion over the ownership status actually originated in September, 1944 when the armistice agreement was concluded. Prior to this date, all refineries were in private hands, and, with the exception of Creditual Minier (in which the government had an interest), all plants with a throughput capacity of 2,500 barrels per day and over were owned by corporations in which western interests were predominant.

The armistice agreement ordered that all plants be requisitioned for war purposes. Until August 1947, when Romania's war status was ended by the peace treaty, the plants were managed by Soviet representatives whose mandates had hardly any limitations. During these three years, the owners or executives could not do much beyond fulfilling orders taken from Soviet or Romanian government appointees. The products were delivered to government agencies for reparation payments to Russia at prices which represented only about 30 percent of the average realization by products in terms of average FOB Gulf prices during the period 1936-38. Payments of the processing costs were regularly delayed by several months and the progressive post-war inflation reduced the actual value of these delayed payments before they were received. When all their reserves were dried up, the processing companies had to live on meager credits granted by the government at high interest. Nominally, the refining industry was still privately owned, but its actual status was one of complete dependence upon government.

Two additional means were used to ruin the private ownership over processing plants. The first is one to which most Communist governments have had recourse: monetary stabilization following sweeping inflation, when discriminatory exchange rates are applied to private enterprises. This began in August, 1947.

Prior to this another discriminatory method had been used for the same purpose. Compensation due from the government to make good damages caused by war was politically distributed, not in accordance with provisions of the statutory law of September, 1943. The bulk of the compensatory credits that a budget overburdened with war reparations could grant have been distributed to companies merged into Sovrompetrol. The remaining companies, mostly western owned, had to use much of their own reserves as well as credits for restoring the plants to operation.

Application of the nationalization law of June, 1948 was simplified, as it involved merely a formal transfer of titles over processing plants remaining private in name only.

Prior to December 1950, the nationalized plants were centralized into two state holdings: Muntenia, managing the refineries located in the Prahova district and in Bucharest, and Moldova, which dealt with the smaller plants located in the Bacau and Neamtz districts. Several plants were shut down, but no major structural changes occurred during this period of Romanian tenure.

In January 1951, the nationalized plants were transferred to Sovrompetrol and the Romanian state voided any property rights it had in them. According to the terms of the repeatedly amended charter of Sovrompetrol, any contribution of either side is merged through total absorption into Sovrompetrol. Hence the plants became indivisible Soviet-Romanian property. The charter also provides that decisions of the joint company are made by the Soviet partner. The deliberative functions are conducted in common, and the carrying out of the decisions is entrusted to

Tank car loading rack at a Ploesti refinery.

Dr. G. G. Rosu studied economics and law at the universities of Bucharest, Berlin and Paris. He was an assistant professor at the Institute of Economics at Berlin University and, until 1947, economic counsellor of the Romanian Ministry for Foreign Affairs. In the latter capacity, he was also charged with the complicated post-war problems of the Romanian petroleum industry, a position which enabled him to know Russia's inroads into Romanian economic life.

the Romanian partner. Hence this partnership is reduced to a sharing of Romanian property with the Soviet government, over which the latter has sole right of disposition. While the Romanian government is regularly footing the bill for all new investment, Russia is contributing only "management and technical advice." Any future increase in assets is to accrue equally to both sides as do the profits.

The ten plants not subject to the nationalization law had been absorbed into Sovrompetrol in 1945-46. Their capacity on a 1940 basis was about 20 percent of the national total. Consequently there has been no privately-owned refinery in Romania since June 11, 1948, the date of nationalization. The Romanian state has today practically no identifiable property rights to any part of the industry.

The annual processing capacity of Romanian plants has increased somewhat over the post-war low, but still is nearly 40 percent below the pre-war level. Statistics are shown in Table I.

After the 1943-44 air raids, processing capacity was reduced to less than half the 1940 peak. With the exception of seven plants including Standard, Sperantza and Xenia, all were gravely damaged and, in some cases, repeatedly hit by Allied bombardments. Of the total damage inflicted on oil installations, amounting to 23.4 billion lei, 19.7 billion lei, or 84 percent, was suffered by refining plants. Computed at present price levels, the replacement cost of these damages may be conservatively estimated at $160 million.

The patching-up work done in 1945-46 with homemade parts and what remained from war-time reserves was a very sketchy operation. A genuine restoration would have provided new installations and parts of foreign make, imports of which have not been permitted. After a post-war record reached in 1946, the refining capacity has gone down visibly. Some installations collapsed, others were closed down because of uneconomic operation, and others were dismantled and cannibalized.

According to the best available information, and after lengthy checking and computations from spare data leaking out of Romania, only the plants listed in Table II appear to be still in operation, with the processing capacities indicated in barrels per day.

All other plants have been closed down or dismantled, partly or completely. The closedown started as early as September, 1947, before the nationalization law was decreed. Among those shut down are included some 23 plants with daily processing capacities below 500 barrels as well as the following bigger refineries: the Sperantza and Orion plants of Unirea (RCO Ltd.), the Moinesti plant (Bacau) of Xenia, Dacia Romano, Neo-Petrol, Noris, the Saturn plant (Buzau) of Petrol Block, and Petrol Latina.

The Prahova plant at Bucharest (Italian interests) has been dismantled, and the salvaged installations, plus Czech equipment ordered as long ago as 1946, was used to erect two plants at Darmanesti in Bacau district. The first went into operation towards the end of 1950, and the second in 1951. It may be assumed that additional equipment has been removed from other shut-down plants, particularly the cracking capacity of the former Unirea (Sperantza) plant at Ploesti-Sud.

In 1951, new equipment of Czech make was brought into the Romano-Americana plant at Teleajen to replace parts of the worn-out pipe stills.

In 1951 work was started at Pestcana de Jiu, ten miles from Tg. Jiu, for the construction of a medium sized refinery. Beyond doubt, much of the equipment for this plant will be supplied from the dismantled plants.

Romanian plants now in operation are in urgent need of repairs and replacements. The local metallurgical industry is not tooled to produce specialized equipment and little can be imported from the satellite area. In spite of all the clamor of the official press, Russia has not supplied any refining equipment.

Plans have been advanced to overcome these obstacles. Last August, a new Soviet-Romanian joint company was established under the name "Sovrom Oil Equipment." Domestic metallurgical plants, which are the property of other Sovroms, are supposed to start producing, in the near future, oil equipment not hitherto made in Romania. Russia will help with blueprints, models and technical advice. According to the local press, some products will be exported. If properly tooled, Romanian metallurgical plants could produce some kinds of oil equipment, but none of the existing plants could produce oilfield equipment of the heavier type or specialized refining equipment.

At the end of 1947, there were 44 raw natural gasoline plants in Romania, as listed in Table III.

Raw products from these plants are fractionated at six stabilization installations located at Boldesti, Moreni (two), Tintea, Gura Ocnitzei and Margineni. As a consequence of the decrease in gas output, eight plants were shut down and another station was moved to a richer gas region at the end of 1947. It may be assumed that, at present, not more than half of the above-mentioned plants are in op-

The former Columbia SAR refinery at Ploesti-Sud with a crude capacity of 9,500 b/d is equipped with cracking facilities and is one of the better Romanian refineries.

eration. Some of them have been dismantled. The lack of activated charcoal for absorbers as well as uneconomic processing contributed to the decision to close part of the plants.

The last known production figures are: 981,000 barrels in 1946, 866,000 barrels in 1947 and 700,000 barrels in 1948.

Since the start of the Russian occupation, the processing capacity decreased both in volume and quality as indicated in Table I. In the past, there always was surplus distillation capacity. At present, however, it seems that there is hardly any important margin left.

To process Romania's total crude output in 1951 of 36,750,000 barrels, the pipe-still distillation capacity was approximately 33,000,000 barrels and the vacuum capacity 12,000,000. Total distillation capacity in working condition was therefore about 45,000,000 barrels, but it must be remembered that part of the capacity is obsolete and uneconomic.

Paraffin-type crude output in 1951 totaled some 30 million barrels, from which a cracking still charge stock of approximately 15 million barrels was available. Cracking capacity is 12,900,000 barrels per year. This means, of course, that maximum gasoline production is not possible until cracking capacity can be enlarged. Asphalt-type crude output of Romanian fields may be estimated at 4,500,000 barrels per year. There is supposed to be adequate still capacity for this type of oil.

Romanian refining installations have not been abreast of the general technical level since 1936/37. There has been no substantial revamping since that time to bring them up to date. Moreover, after the armistice, the existing installations were subjected to strenuous operations which shortened their life. Often, the crude was processed only irregularly. This subjected the refinery equipment to great variations of temperature, caused by frequent shutdowns.

Two thirds of the distillation capacity is pipe still. The newest installations are those of the Darmanesti plants, of Czech make, and the Brazi refinery, of German make, produced early in 1944. With the exception of the modest lubricant installations at Darmanesti (formerly Prahova) and at Brasov (Photogen), there are no other installations capable of producing lubricants of high quality starting from paraffinous crude. During the last war two reforming units were constructed which are seldom used. A sulfuric acid alkylation unit was built at the Astra Romana plant with a capacity of approximately 300,000 barrels per year. This never has been operated.

The obsolete equipment, together with the lack of additional modern installations, hampers a better utilization of the crude production. On the average, only 24 percent of the processed crude is recovered as gasoline. An all-time record of 27 percent was reached in 1943. Individually, only the Brazi refinery attained a level of 34 percent gasoline from the processed crude.

The current five-year plan provides for doubling the cracking capacity, and for increasing the gasoline output by 30 percent. This would bring the gasoline yield to some 35 percent. Compared with western standards, this is, indeed, a modest aspiration. Nothing is said about improving the lubricants production.

It is true that, before 1944, processing was split among a great number of medium and small-sized plants whose production was qualitatively inferior and whose processing was comparatively expensive. However, the volume of production of this category of plants was far too modest to cover the domestic consumption. It is not the operation of these small plants that is the cause of poor utilization of the crude. Obsolescence of the big plants is the prime cause, for they are technologically behind by at least 15 years.

The present regime completed in 1948 the suppression of all small and medium sized plants. This has concentrated refining in a few large plants without making any additional investments. The solution of current shortcomings lies in raising the technical level of the refining process. This, in turn, requires substantial investments in equipment imported from the West. Yet, on the one side, the Soviet occupation is determined to avoid any important investments in Romanian petroleum and, on the other, the export of such installations to the Soviet area is barred. Briefly, under existing conditions, little progress in Romanian crude oil utilization may be expected.

TABLE I

Year	Distillation	Cracking	Lubricants	Asphalt	Paraffin
	(Thousands of Barrels)				
1940	72,000	15,000	3,750	1,200	97
1943	57,000	12,000	2,850	900	15
1944	33,750	6,000	2,250	600	15
1945	43,550	9,000	2,700	750	38
1946	50,250	13,500	3,000	787	53
1948	40,926	12,348	3,000	800	53
1951	45,378	12,900	3,000	800	60
Planned:					
1955	Undisclosed	25,200		Undisclosed	

TABLE II

Former Owner	Location	Type[a]	Crude Oil Capacity (Barrels Daily)	Cracking Capacity (Barrels Daily)
Astra Romana (Royal Dutch-Shell interest) Present name: Prima Rafinarie	Ploesti-Sud	Compl.	34,000	12,000
Romano Americana (SONJ Interest) Present name: Rafinaria Teleajen	Teleajen-Prahova	Compl.	20,000	6,800
Vega (Concordia SAR)	Ploesti-Nord	Compl.	20,000	4,600
Colombia SAR	Ploesti-Sud	SC	9,500	3,300
Standard (Petrol Block) (Soviet interest)	Ploesti-Nord	SC	7,500	3,450
Creditul Minier (Govt. interest)	Brazi-Prahova	SC	6,450	2,500
Steaua Romana SA Present name: Rafinaria Campina	Campina	SL	12,000	——
Doicesti SAR (Soviet interest)	Doicesti-Dambovitza	S	1,500	——
Venus (Romano-Belgiana) Present name: Rafinaria Ramnicul Sarat	Ramnicu-Sarat	S	1,350	——
Photogen (Socony-Vacuum interest) Present name: Rafinaria Muntenia	Brasov	SL	750	——
Darmanesti (ex-Prahova)	Dramanesti-Bacau	SL	4,000	——
Darmanesti	Dramanesti-Bacau	SCL	6,200	2,600
		Total Daily capacity	**123,250**	**35,250**

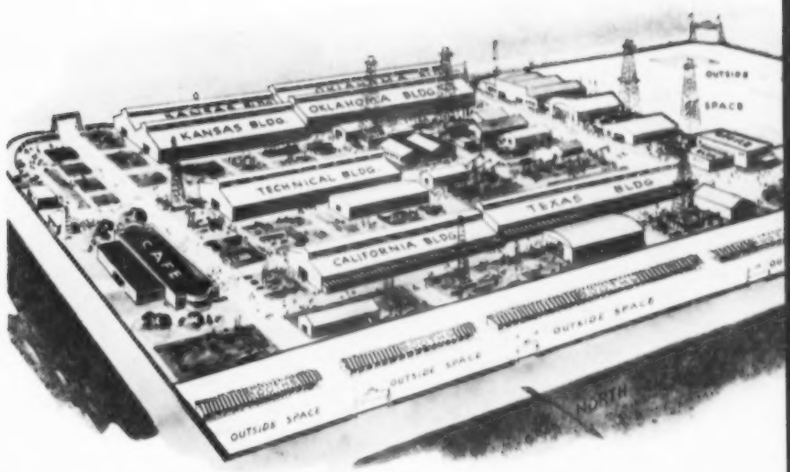
a) Compl.—complete; S—skimming; C—cracking; L—lubricants.

TABLE III

Romanian Natural Gasoline Plants

No. of Plants	Former Owner	Max. Quantity of Gas to be Treated 000s of cu. M.	Max. Quantity of Gasoline Obtainable bbls/Year
7	Astra Romana	918,000	866,250
6	Steaua Romana	672,500	717,250
3	Romano Americana	380,000	274,500
5	Concordia	478,875	396,000
9	Unirea	480,000	345,000
4	Colombia	262,800	281,962
3	Prahova	135,000	115,250
3	Creditul Minier	231,000	270,000
1	Redeventza	120,000	37,500
1	Desbenzinarea	100,000	67,500
2	Other	106,825	78,788
44	**Total**	3,885,000	3,450,000

Oil show expects record attendance



Five years of oil industry progress since the last International Petroleum Exposition in 1948 have caused growing pains at the oil show plant. Two new exhibit areas, shown in white on the above sketch, have been added to fill more space demands for the 1953 oil show, May 14-23.

OIL MEN AROUND THE WORLD — from Saudi Arabia to Sumatra — are the targets of a global effort aimed at stimulating world-wide attendance for the Tulsa, Oklahoma, International Petroleum Exposition next May 14-23. Last held in 1948, the oil show has been in preparation for nearly a year.

Recognized as the world's foremost industrial show devoted exclusively to a single industry, the exposition is operated by and for all segments of the industry. Since its inception in 1923, it has been the showcase of what is new—and what will be new—in the myriad operations of the international oil industry. In the 1953 exposition will be displayed more than 1,500 exhibits valued at up to $100,000,000.

Two extensive expansions have been added to the plant which accommodated the 1948 show. One of these included 100 new covered display booths. Despite this, all covered exhibit space has been taken and no inside booths are now available. William B. Way, exposition general manager, said 20,000 square feet of outside space has been made available for exhibits suitable for outdoor display. This space is a part of the exposition plant, and is available in sizes suitable to individual needs. The area is supplied with utilities.

S. B. Hyde, right, chief of the fairs and exhibitions section of the U. S. Department of Commerce, and William B. Way, general manager of the oil show. Mr. Hyde's staff is cooperating in publicizing the oil show abroad through official Department of Commerce channels.

Thousands of oil men throughout the United States and other oil countries of the free world will serve on committees already formed, or soon to be appointed, to arrange and conduct special events and other activities during the exposition. Lists will be completed soon for committees which will plan and coordinate oil show activities for the drilling, exploration, refining, production, pipelining and marketing divisions of the industry, said W. G. Skelly, IPE president.

"Men in all segments of the industry are cooperating in committee efforts which will assure us the greatest oil show in history," Mr. Skelly said. "With this assurance of industry-wide participation, we have already shattered all previous pre-show records. The attendance record also is threatened," Mr. Skelly said. In 1948 visitors from 43 nations viewed the exposition. Based on reports from "oil show ambassadors" around the world, it is predicted that the 1953 show will draw attendance from 50 nations.

Cooperating in the task of generating interest and attendance from abroad are the NOMADS organization, composed of oil equipment manufacturers and suppliers; the U. S. Department of State; the Department of Commerce; and a host of exposition ambassadors appointed by Mr. Skelly. "Chief Ambassador" is Oklahoma's Governor Johnston Murray, who has toured more than 15 Latin American countries in behalf of the exposition. Governor Murray extended special invitations to more than 600 oil men and government officials in Central and South America.

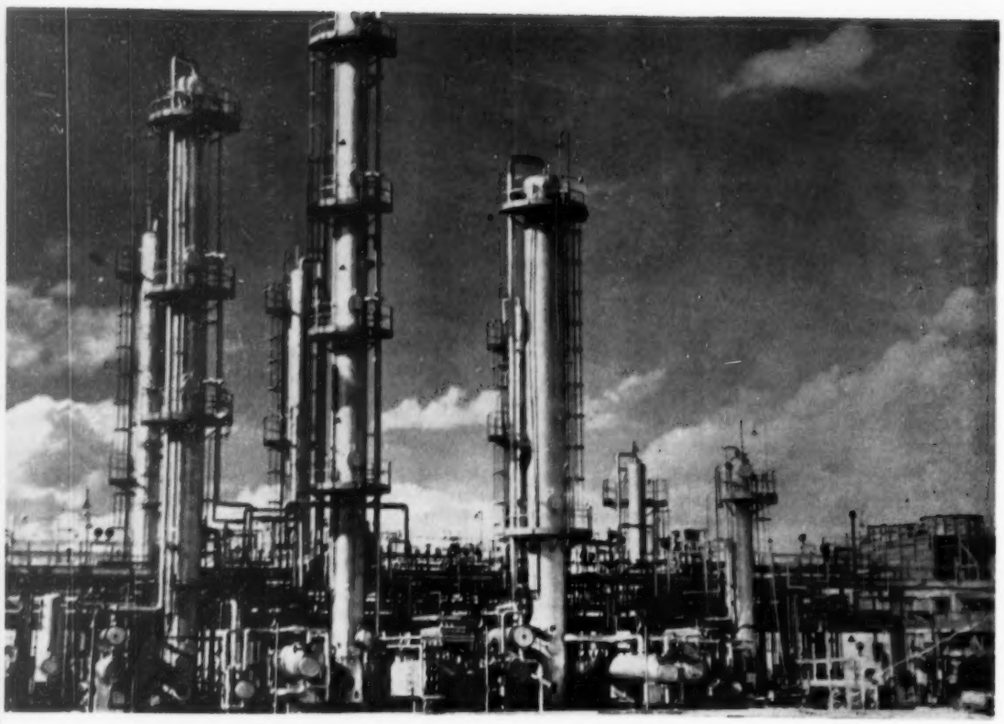
Spearheading the industry's big guns to build international attendance is the NOMADS organization. Harry E. Estes, Houston, Texas, executive secretary of the NOMADS national board of regents, is head of the organization's exposition committee. He has appointed an international attendance committee composed of members of NOMADS chapters in New York, Los Angeles, Tulsa, Houston and Dallas. Invitations from NOMADS are being sent to their clients and acquaintances in more than 60 nations of the free world.

The NOMADS will not be content with merely attracting international delegates. They have made elaborate plans to properly welcome visitors from abroad. For this purpose, committees have been named for reception, registration, residence listings, transportation and special tours for foreign visitors. For the first time since World War II, foreign manufacturers will participate as exhibitors.

Outstanding as an educational feature of the exposition, in addition to commercial exhibits, will be the Hall of Science, recognized as the world's foremost museum of science and industry devoted solely to petroleum and its products.

Heading the scientific and technical committee is G. H. Westby, president of Seismograph Service Corp., Tulsa. Serving as special consultants are Dr. Gustav Egloff, Universal Oil Products Co., Chicago; Dr. B. B. Weatherby, internationally known geophysicist of Amerada Petroleum Corp., Tulsa; and A. L. Solliday, executive vice president of Stanolind Oil & Gas Co., Tulsa.

One of the busiest groups now at work on the oil show is the housing committee. With some 20,000 industry representatives expected, adequate special accommodations must be arranged months in advance. More than 1,150 private Tulsa homes have been listed by their owners for the use of visitors to the oil show.



Shown here are the fractionation system towers and extraction system reboilers of the new plant. To the left, although not visible in the photograph, are the catalytic reactors and flue-gas generator.

Hydroforming in Argentina

By J. J. Swift, S. R. Stiles, E. W. Howard, M. Tarnpoll, The M. W. Kellogg Co.

AUTHORS' NOTE

The Hydroforming and Aromatics Extraction Plant known as Planta K, described herein, is a military installation erected according to the 5-year Government Plan, 1946-1951, of the President of Argentina General D. Peron and the Minister of National Defense General D. Humberto Sosa Molina. Planta K is integrated in the group of factories and plants which constitutes the Direccion General de Fabricaciones Militares. Working with the M. W. Kellogg Company on this project in behalf of the D.G.F.M. were the Director General de Fabricaciones Militares, General D. A. J. Intzaurgarat, the Jefe del Grupo de Fabricas de Polvoras y Explosivos, Coronel D. R. Barrera, and the technical advisor and operating superintendent, Engineer J. Krall. For purposes of military security, as prescribed by the Argentine Army, capacity figures and other revealing information have been omitted. The writers are indebted to the Direccion General de Fabricaciones Militares for permission to publish this article.

THE SUCCESSFUL OPERATION of the hydroforming and aromatics extraction plant recently completed for the Argentine government marks an important step in the nation's far-reaching program of self-sufficiency and industrial development. This hydroforming and aromatics extraction plant is the only one of its kind in the world outside of the United States.

The project was conceived and constructed by the Direccion General de Fabricaciones Militares (D.G.F.M.) for the primary purpose of manufacturing nitration grade toluene. The plant was designed by The M. W. Kellogg Company, while construction and operating assistance was supplied by its Latin-American subsidiary, Kellogg Pan American Corp. Although the plant was originally designed for producing nitration grade toluene, it has also, since the start of operation on April 26, 1951, produced nitration grade benzene, and finished aviation gasoline of 91/98 and 100/130 grades.

Hydroforming process design has undergone considerable development since its introduction some 12 years ago. Practical considerations of desired capacity, capital expenditure and local conditions peculiar to the project dictated the final design of the Hydroformer for this project as a fixed bed unit having two catalytic reactors and following the basic design of many previous Kellogg Hydroforming units. The aromatics recovery system uses the phenol extraction principle under license from the Shell Development Co.

Prior to the initiation of the process design, considerable Hydroforming pilot plant studies and analytical work were carried out in the Kellogg laboratories to

establish the basic factors of the design for the feed stocks which were contemplated being used by the D.G.F.M. The basic laboratory work was directed primarily to the production of toluene using narrow-boiling C_7 fractions from Comodoro Rivadavia and Challaco crude oils which are native to Argentina.

Because of local difficulties precluding the possibility of obtaining feed stock from the Challaco crude source, a narrow-boiling range C_7 fraction obtained from Comodoro Rivadavia crude was taken as the feed stock for the toluene operation.

Average feed stock showed the following characteristics:

	Feed
Specific Gravity	0.7346
ASTM Distillation	
Initial Boiling Point	97.6°C
5%	98.3
10	98.7
20	99.0
30	99.2
40	99.5
50	99.8
60	100.2
70	100.7
80	101.5
90	102.7
95	104.2
Dry Point	106.6
End Point	
Vol. % Paraffins	55.95
Vol. % Olefins	6.73
Vol. % Aromatics	2.77
Vol. % Naphthenes	34.65
Nitration Grade Toluene Guarantee Yield	19.3 Wt. %

The operation of the plant showed the following yields for the toluene operation:

	Corrected Yields Wt. percent (Output Basis)
Gas	11.0
Light Naphtha	50.5
Heavy Naphtha	5.0
Polymer	1.8
Nitration Grade Toluene	31.4
Coke	0.3
Total	100.0

Because of a lack of instruments, at the time, to permit the measurement of quantities leading to the calculation of coke production on the catalyst, the figure of 0.3 Wt. % coke included in the yield figures has been assumed the same as the coke figure used in the design calculations.

The inspections of the products resulting from toluene operation may be exemplified by the composite average of the products obtained during the test run, as shown in Table I.

The quality of the toluene produced in Planta K is considerably superior to the specification requirements for nitration grade toluene. This quality is obtained at the expense of yield, and producing toluene just meeting the ASTM specifications would result in an increased toluene yield.

The light naphtha produced in the toluene operation is a mixture of the light naphtha obtained from the first fractionator tower in the Hydroformer recovery system and the light naphtha from the overhead of the phenol recovery tower

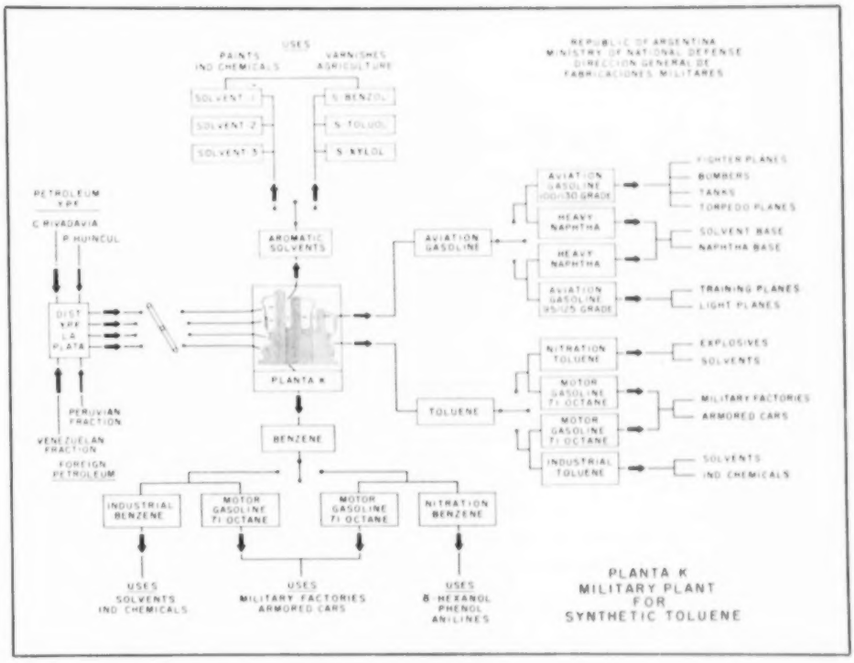


TABLE I

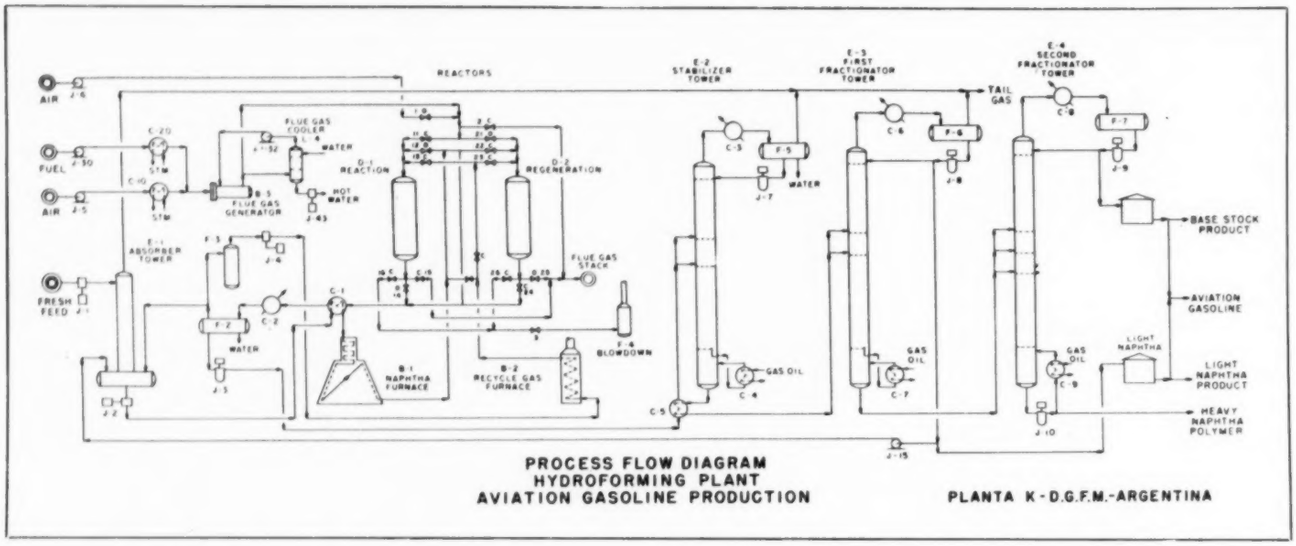
	Raw Concentrate From Hydroformer (Feed to Extraction)	Light Naphtha	Heavy Naphtha	Toluene
Specific Gravity	0.7717	0.7104	0.9033	0.8716
ASTM Distillation				
IBP—°C	94.5	43.0	140.0	110.3
5%	98.0	52.0	141.5	110.4
10	99.0	61.5	142.0	110.4
20	100.5	76.8	143.5	110.5
30	100.6	82.5	145.0	110.5
40	101.3	86.2	148.0	110.6
50	102.2	88.8	151.0	110.6
60	102.3	91.2	158.0	110.6
70	103.3	93.3	168.0	110.6
80	104.6	95.5	228.5	110.6
90	105.9	98.4	260.0	110.6
95	108.8	102.3	278.5	110.6
Dry Point	114.3	104.0		110.8
End Point			300.0	
Vol. % Olefins	4.8	8.6		
Vol. % Aromatics	47.2	14.4		100.0
Vol. % Paraffins	48.0	77.0		
Vol. % Kattwinkel			100.0	
Octane No.—CFRM		60		
Cctane No.—CFRR		65	80-90	

following the extractive distillation. The quality of this light naphtha, therefore, is a function primarily of the efficiency of the extraction process since any unextracted aromatic will be found in this light naphtha. This product is being used as a motor gasoline by the D.G.F.M. and shows a lead susceptibility such that the octane number is raised from 60 CFRM-clear to 81 CFRM with 3 cc TEL. The heavy naphtha, which is a polymer product obtained from the bottom of the second fractionator tower above the aromatic concentrate cut, is rich in xylenes. This heavy naphtha product, because of its rich aromatic content, is disposed of in great part by sale to a refinery where it is used for solvent production, while some of the heavy naphtha is rerun to gasoline end point which, because of its high octane value, is blended directly into motor gasoline production.

The toluene operation settled out smoothly in a 40-hour total reactor cycle time for which the breakdown of functional times is approximately as follows:

Reaction	20 hrs.	0 min.
Recycle Gas Purge		15 min.
Depressure		15 min.
Coke Burning	16 hrs.	30 min.
Reheat	1 hr.	30 min.
Catalyst pretreat	1 hr.	
Repressure		30 min.
Total	40 hrs	

Following approximately three months



PROCESS FLOW DIAGRAM
HYDROFORMING PLANT
AVIATION GASOLINE PRODUCTION

PLANTA K - D.G.F.M. - ARGENTINA

in toluene operation, the unit in continuous stream was switched by change of operating conditions to a benzene operation using a narrow-boiling range C_6 fraction derived from Comodoro Rivadavia crude oil. Unfortunately, there was only available a supply of C_6 feed stock for approximately six days of operation so that this interim operation was considered to be merely an exploratory run to establish desirable operating conditions for production of benzene.

The C_6 feed stock used in the operation in general had the following characteristics:

Specific Gravity	0.7015
ASTM Distillation	
IBP—°C	66.7
10%	74.0
50	75.0
90	80.0
End Point	82.3
Vol. % Aromatics	5.0
Vol. % Naphthenes	63.7

This distillation range includes whatever content in the crude there may be of cyclohexane and methylcyclopentane. The cyclohexane is the preferred feed stock for benzene manufacture in conventional Hydroforming equipment, while methylcyclopentane is a less desirable component of a C_6 charge stock for benzene production. This exploratory benzene run yielded a nitration grade benzene of a quality superior to that required by ASTM specifications.

Upon the completion of the interim benzene operation, attention was directed to the possibility of producing 100/130 grade aviation gasoline from Planta K. Argentina was, to a major extent, dependent upon imports for aviation gasoline, and the local situation at the time dictated the need for a native production.

The function of the Hydroforming operation in the aviation gasoline picture in the past has been devoted primarily to the production of an aromatic base stock, which is then blended with other aviation components. Considering Planta K in this regard, the potentialities of the Hydroforming and fractionation section for aviation gasoline production were felt to fall into two categories:

A. Production of 93-160°C aviation base stock which would then require blending with alkylate or isooctane and isopentane to produce the finished aviation gasoline.

B. The production of a complete finished 100/130 grade aviation gasoline directly from the fractionation section of the plant. A complete gasoline could be produced by selective blending of the light naphtha and aromatic base stock, produced in individual towers in the fractionation system, to meet the volatility specification of the aviation gasoline.

The phenol extractive distillation system was shut down and, as shown in the accompanying diagram, the Hydroformer fractionation system was adapted for the aviation operation in which the stabilizer tower is used for control of the front end volatility, the first fractionator tower is used to produce a light naphtha cut overhead of approximately 93°C end point, while the second fractionator tower produces a base stock overhead of approximately 160°C end point and a heavy naphtha polymer from the bottom. A recycle of light naphtha is circulated from the reflux drum of the first fractionator overhead to the absorber tower accumulator drum where the recycle is mixed with the entering fresh feed to constitute the total charge to the catalyst reactors.

The stabilized net light naphtha product from the overhead of the first fractionator and the base stock from the overhead of the second fractionator are selectively blended to meet the volatility specifications of the aviation gasoline desired. This blended gasoline is then leaded with the maximum permissible concentration to produce the finished 100/130 grade aviation gasoline. Using the United States Government specifications for 100/130 grade aviation gasoline as a criterion, the finished gasoline so produced is approved as satisfactory and acceptable for use by the Argentine Ministry of Defense.

The performance ratings for the Planta K aviation gasoline are determined officially by the standard F-3 and F-4 rating machines located at an air base laboratory. These performance ratings indicate a number of 100 for the F-3 test and a number in excess of 130 for the F-4 test. It was found initially that the F-4 performance number could be varied, within the limitations imposed by vapor pressure and volatility specifications, by adjustment of the ratio between the light naphtha and base stock used in the blend. With a change in operating conditions, and by this same method of selective blending of the aviation components, there is produced also very readily 91/98 grade gasoline and 95/125 grade gasoline which are also acceptable for use by the Ministry of Defense.

The fresh feed charge to the aviation gasoline operation is a light naphtha derived from an Oficina crude oil. In general, the feed stock charge to the Hydroforming operation has an ASTM boiling range of 30°C to 150°C with 45 volume percent distilling at 100°C and contains approximately 14 volume percent aromatics and 30 volume percent naphthenes.

Since the Planta K Hydroformer is designed primarily for aromatics production using a narrow-boiling feed, the operation for aviation gasoline production using a wider boiling range feed stock finds its capacity limitation dictated by the capacity of the catalyst coke burning facilities. This capacity factor has influenced the use of the low end-point feed stock. When a higher end-point feed stock is received at Planta K, it is first rerun at

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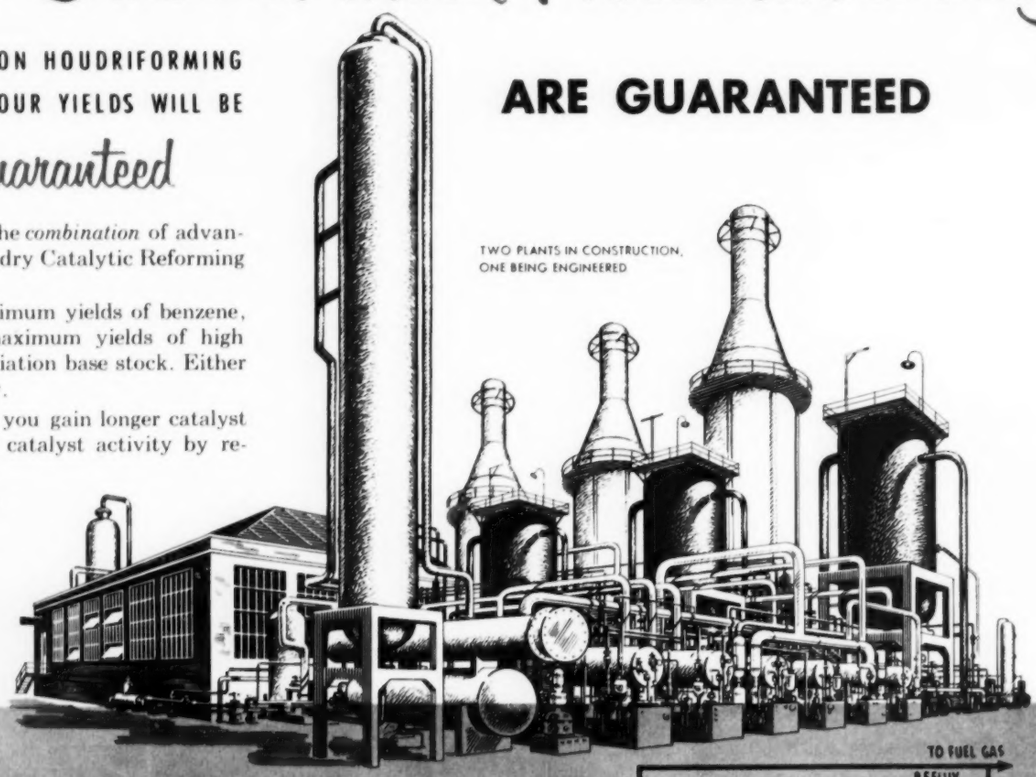
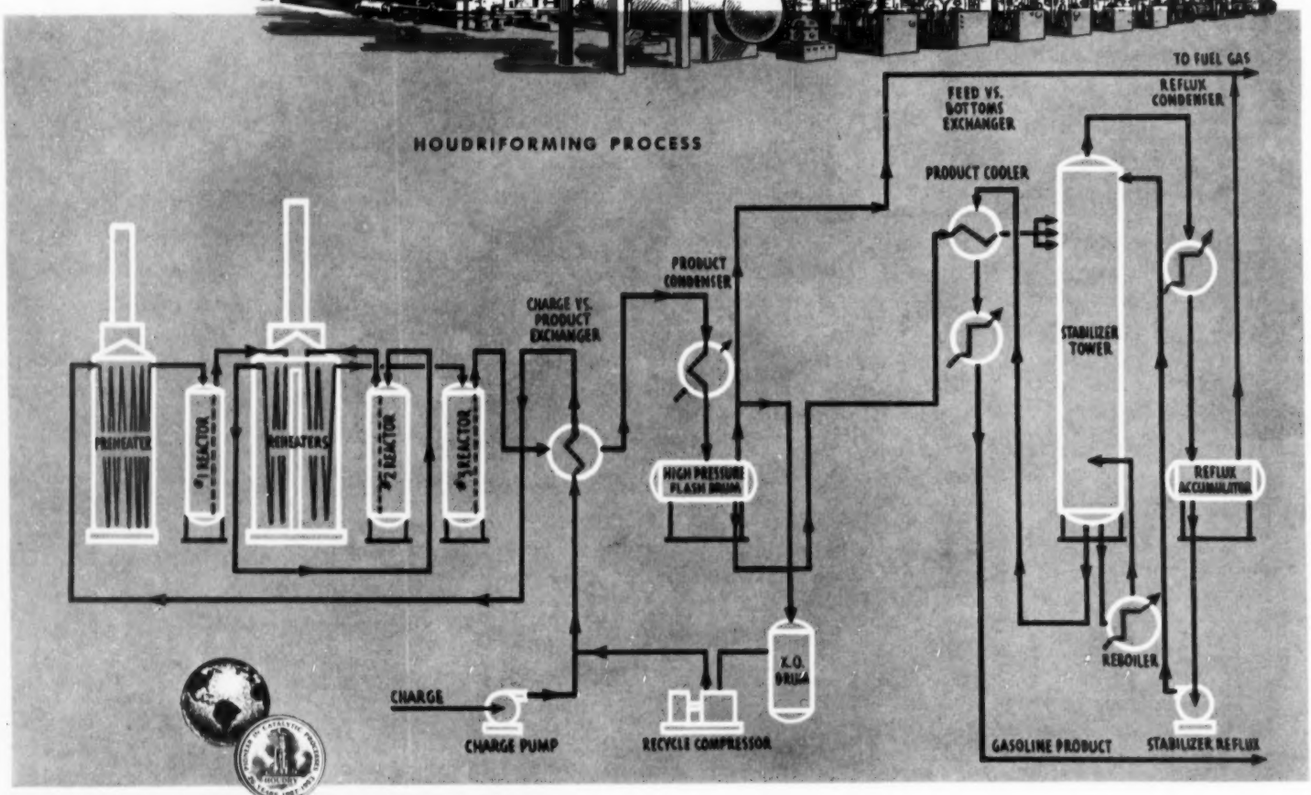


TWO PLANTS IN CONSTRUCTION, ONE BEING ENGINEERED



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150°C end point. With this feed stock, the aviation operation is maintained in an approximately 40-hour total cycle time in which the reaction period is 20 hours. The yield of finished aviation gasoline from the operation is upwards of 50 volume percent on fresh feed.

The heavy polymer naphtha produced above the end point of the aviation gasoline, from the bottom of the second fractionator tower, has a high aromatic content and is disposed of by sale for solvent production. This heavy naphtha is used also in part as a motor gasoline component, in which case it is first rerun to end point and has an octane number of approximately 88 CFR-Motor method clear.

The construction of Planta K is distinguished by a unique plot plant arrangement using an L-shaped concrete covered platform open on all sides. The top of this structure serves as the pipe alley, containing all the process and auxiliary piping required for pumps and vessels. The towers are arranged in line along the two long sides of this structure, and the Hydroformer reactors and furnaces are arranged at the short side of the L shape. Pumps are arranged in two long lines underneath the platform, the platform thereby also serving as a pump shelter.

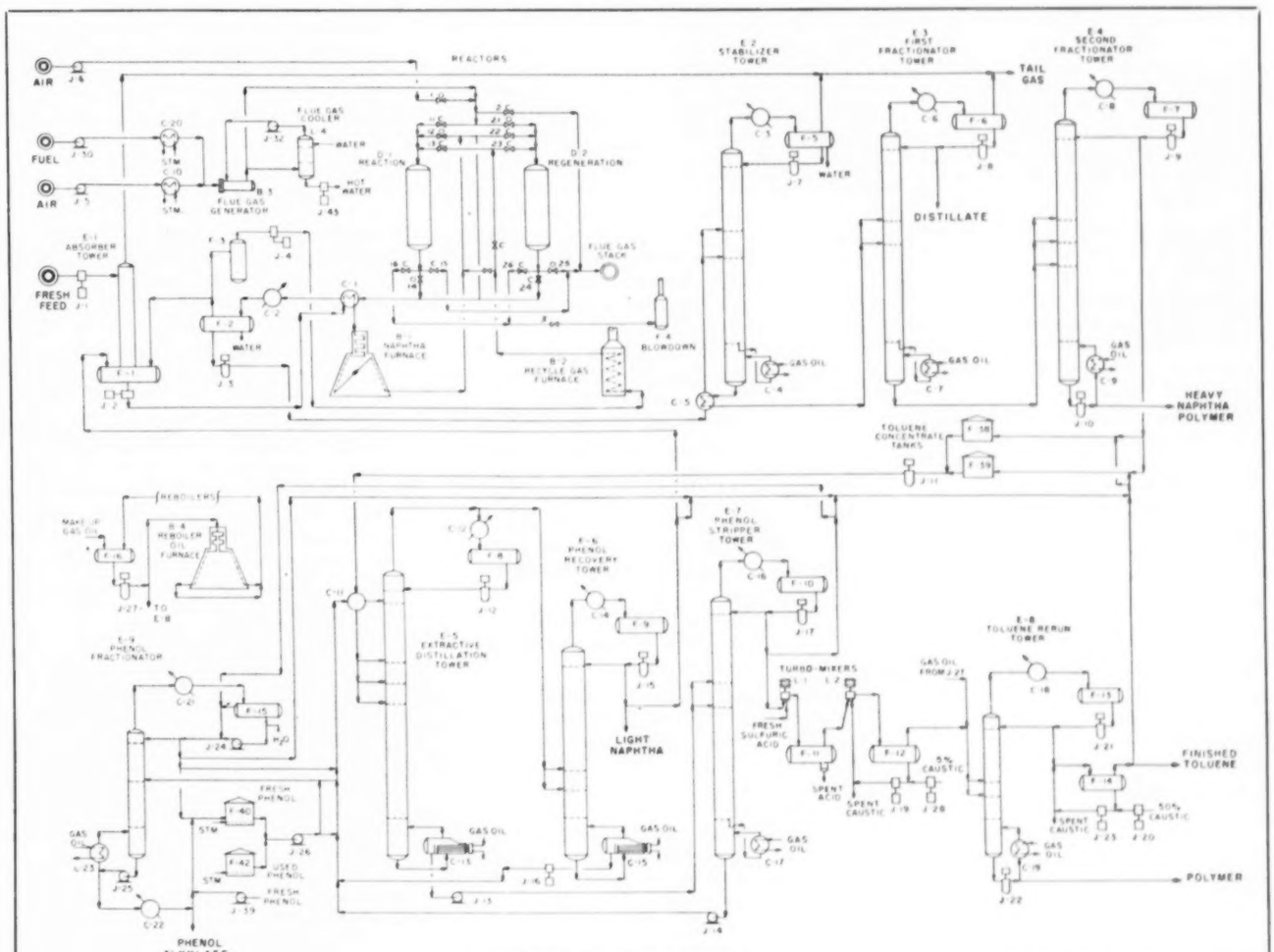
The pumps are preponderantly of the centrifugal, vertical deep-well type, situated as closely as possible underneath their respective suction vessels to provide the required suction head. In this way, the vertical pumps contribute to the economical engineering design of the plant.

Basic studies in the laboratories of The M. W. Kellogg Company prior to design of the plant confirmed the use of Kellogg Low Soda catalyst for the Hydroforming reaction. This catalyst has in fact proved exceedingly effective in the aromatic and aviation gasoline operations and has also shown long life. The plant has been in operation practically continuously for more than a year since April 26, 1951, when it went on stream. During this period, one reactor still retains its original catalyst charge while the other reactor required a catalyst change after eight months due to an operational emergency which caused excessive overheating of the catalyst bed.

Prior to the design of the plant, Kellogg pilot plant studies on the feed stocks contemplated being used by D.G.F.M. established the operating conditions for the design of the Hydroformer as follows:

Reaction	
Reactor Average Bed Temperature	900°F
Reactor Average Bed Pressure	300 psig
Space Velocity—V/Hr/Vc	0.75
Gas Recycle-Basic Reactor Charge	2500 cu.ft./bbl.
Liquid Recycle Ratio-Recycle/Fresh Feed	2
Hydrogen Content in Recycle Gas	69 Vol. %
Hydrogen Enrichment	None
Catalyst Regeneration	
Max. Burning Temperature	1100°F
Circulating Flue Gas-Temp. Range	650°F to 1100°F
Regeneration Pressure	5 psig

In a fixed bed unit specific operations follow in sequence and are controlled to achieve a definite cycle time, and for the design of this Hydroformer the following



PROCESS FLOW DIAGRAM
TOLUENE-BENZENE PLANT
HYDROFORMING AND PHENOL EXTRACTION

PLANTA K-D.G.F.M.-ARGENTINA

list of functional times was established:

Reaction	24 hrs.	
Recycle Gas Purge		5 min.
Depressure		10 min.
Flue Gas Purge		5 min.
Coke Burning	18 hrs.	
Catalyst Reheat	2 hrs.	
Catalyst Pretreat	1 hr.	
Repressure		15 min.
Valve Changes		25 min.
Idle	2 hrs.	
Total	48 hrs.	

This design cycle time incorporates sufficient flexibility so that, at will, the total time can be varied to whatever time might be desired.

The equipment at Planta K consists of two Hydroformer reactors containing the catalyst wherein the conversion to aromatics is accomplished under specified conditions of operation. Coke is deposited on the catalyst during the reaction period, thus requiring that the catalyst be periodically regenerated, i.e., while one reactor is in reaction operation, the spent reactor bed is being regenerated by burning the coke deposition on the catalyst. Associated with these reactors is the regeneration equipment consisting primarily of a flue gas generator which serves as a source of the flue gas used to control the rate and temperature of the burning operation. A predetermined concentration of hydrogen is maintained in the reaction zone by recycling a portion of the hydrogen rich gas produced by the reaction. Products of reaction are recovered into the desired fractions in the Hydroformer fractionation facilities, and the aromatic concentrate is sent to intermediate storage. This crude aromatic concentrate is subsequently contacted countercurrently with phenol in a distillation tower and the aromatic portion of the concentrate is extracted in the phenol phase. Toluene, or benzene, is then removed from the phenol and is subsequently purified by acid treating, followed by caustic neutralization and rerunning to produce the finished nitration grade aromatic.

In the main, the Hydroforming unit for production of toluene or benzene from a narrow boiling fraction is essentially the same as a Hydroforming unit devoted to the production of motor gasoline from a wide boiling range naphtha stock. The major process steps as incorporated in the design of this Hydroformer may be summarized briefly as:

1. Oxygen removal from the naphtha feed in the gas absorber tower.

2. Heating the naphtha charge and recycle gas to the desired reaction temperature.

3. Reacting the naphtha and recycle gas in the catalyst chamber and cooling the products of reaction.

4. Recirculating the separator gas, rich in hydrogen, as recycle gas to the absorber tower.

5. Regeneration of the spent catalyst. Unique design features distinguish this plant from other comparable Hydroformers. Because of the expected high conversion of naphthenes to aromatics and the high heat of reaction involved, a recycle stream of light naphtha containing essentially paraffins and unconverted naphthenes is recirculated from the overhead reflux drum of the phenol recovery tower to the absorber tower accumulator drum where this recycle mixes with the fresh feed to become part of the total reactor charge. This recycle, which is primarily a diluent, is in the ratio of two to one basis fresh feed, and provides a control over the reaction rate in the reactors. At the same time, this recycle provides additional heat input to the reactors without the danger of overheating the fresh feed stock. The hydrogen-rich recycle gas rate of 2,500 cu. ft./bbl. is based on the total reactor charge including the recycle.

Unlike other Hydroformers, this unit is designed for catalyst regeneration at essentially atmospheric pressure primarily because of the low coke production and the lack of economic necessity for steam generation from hot flue gas. Inert gas is generated from light liquid fuel and air at sufficient pressure with controlled rate O_2 concentration and temperature to maintain a maximum allowable regeneration temperature of 1,100°F in the catalyst bed. By means of the newly designed water cooling provision, it is possible during regeneration to control the flue gas temperature in the range of 650 to 1,100°F and with O_2 concentrations from 0-20.5 weight percent. The volumetric capacity of air and flue gas can be varied from 50 percent to 100 percent of design capacity. These operational conditions permit maximum flexibility during the regeneration and reheating periods of the complete Hydroforming cycle.

The main process steps incorporated in the phenol extractive distillation design may be summarized briefly as:

1. Contact of the aromatic concentrate with circulating phenol in the extractive distillation tower in which the desired aromatic is removed in the phenol phase.

2. Recovery of phenol from the hydrocarbon vapor overhead of the extractive distillation tower in a separate phenol recovery tower.

3. Separation of the pure aromatic from the phenol phase in the phenol stripper tower.

4. Acid wash, caustic neutralization and rerunning, followed by drying of the finished nitration grade aromatic.

5. Phenol clean-up to recover the used phenol which ordinarily might be discarded

The recovery of the pure aromatic by phenol is dependent upon the temperature and the ratio of circulating phenol to the aromatic concentrate charged to the extractive distillation tower. For design purposes a phenol to concentrate ratio of 6.0 to 1 was used for the toluene extraction. This ratio affords an adequate flexibility in the operation so that maximum recovery can be obtained. In operation the loss of toluene overhead from the extractive distillation tower is minimized, and the use of a separate phenol recovery tower provides a medium for effective fractionation between the unextracted hydrocarbons and the phenol carry-over from the extraction tower. The separated phenol from the bottom of this tower is returned to the extraction tower, thereby minimizing losses of phenol from the operation.

Unique features in this design contribute greatly to the efficiency of the operation. The acid treating of the pure aromatic results in the formation of a very small amount of acid polymer which is subject to thermal decomposition at elevated temperatures. Therefore, in the rerun tower, which is designed to remove any acid polymer formed, some gas oil is injected intermittently with the feed to the rerun tower to dilute the acid polymer in the tower reboiler system, thereby holding the thermal decomposition of this material to a minimum at the temperature required for the reboiling operation. Any thermal decomposition would show itself in sulfur contamination of the pure aromatic overhead of the rerun tower.

An additional feature is provided in the form of the phenol fractionator to recover contaminated phenol which ordinarily might be removed from the unit. This phenol fractionator is designed with a threefold purpose which includes a) cleaning out the heavy ends from used phenol by removing phenol alkylates formed during the extraction operation, b) drying of wet phenol, and c) drying of phenolic water. The phenol fractionator is so designed that it may be used in intermittent operation apart from the main extraction system, or it may be used continuously, taking its place in the extraction system sequence.

The heat medium for the many reboilers in the fractionation and extraction systems is provided by a closed circulating gas oil system with a separately fired reboiler oil furnace. This reboiler system, with controls at the individual reboilers, is designed to provide effective reboiler control, as desired, independently of the functioning of any other portion of the plant.

The approximate design utilities for the whole plant, as indicated on a per barrel naphtha fresh feed rate, are:

Total High Pressure Steam	64 lbs/bbl fresh feed
Total Cooling Water	8.1 gpm/bbl fresh feed
Tempered Cooling Water	2.3 gpm/bbl fresh feed
Fuel Oil	140,000 Btu/hr/bbl fresh feed
Total KW Light and Power	0.6 kw/bbl fresh feed

An accompanying diagram illustrates the flow during the toluene operation.

EDITOR'S NOTE

The original text of the paper prepared by Messrs. Swift, Stiles, Howard and Tarnpoll has been condensed by the editors for publication in this issue of WORLD PETROLEUM.

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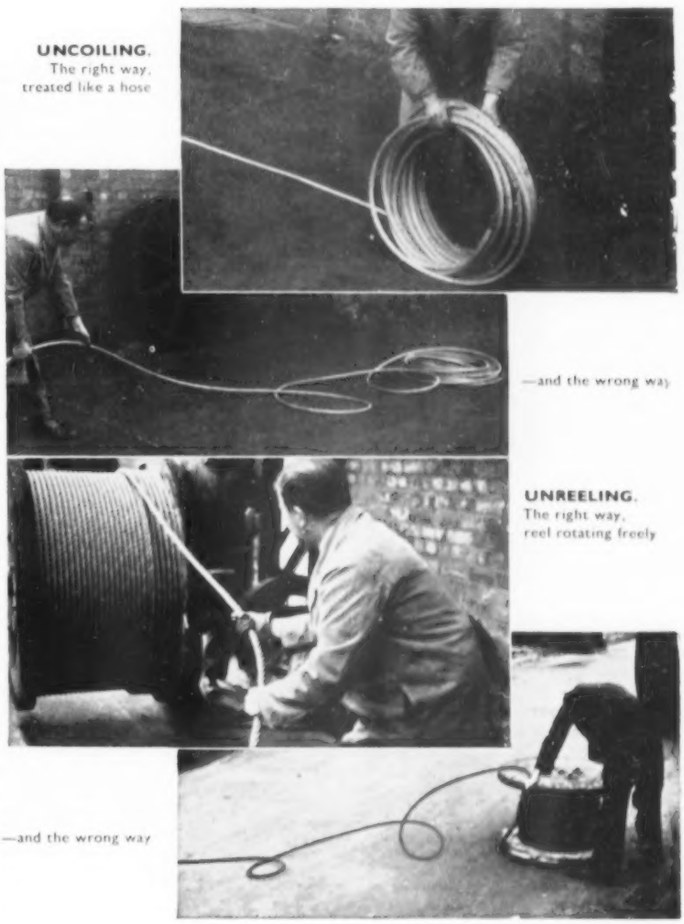
IF ROPE COULD TALK . . .

"I'm mighty like a hose!"



UNCOILING. The right way, treated like a hose

—and the wrong way

UNREELING. The right way, reel rotating freely

—and the wrong way

Good rope repays care in handling. Never allow kinks to form when UNCOILING or UNREELING a steel wire rope. Treat it like a hose pipe. A light coil of rope may be unrolled along the ground but should always be kept under control. A reel may be placed on a turntable or mounted on stands and supported by a bar or tube through the hole in its centre. In no case should a coil or reel be laid on the ground and the end taken over; kinks will inevitably form and the rope's life and efficiency be seriously reduced. When COILING down a rope always put in under-turns as required to counteract the tendency of the rope to twist itself. Under-turning is simple — the rope itself will indicate that.

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BRITISH OIL NEWS

By E. Lawson Lomax

While smaller in area than some of its neighbors, Kuwait has climbed to top place among Middle East oil producers with an outturn in November last of 3,229,942 tons (approximately 795,000 barrels daily). Cumulative production from the company's Burgan field from its opening in 1946 to the end of November attained the impressive figure of 100,129,531 tons, or roundly 750 million barrels.

This rapid growth makes Kuwait an outstanding figure in the international industry and is recognized as reflecting great credit on its personnel, from C.A.P. Southwell, managing director, through the American and British staff to all the various grades of skilled and semi-skilled Arabian employees. When the writer visited this field a few weeks ago, the co-operation between all grades of staff and the cordial relations existing among them was clearly in evidence and could not have been missed even by the most casual observer. Talks with various members of the staff and with local residents demonstrated the existence of this good fellowship.

Mr. Southwell was included in the Queen's New Year's Honors List, being made a Commander of the British Empire (CBE), a signal distinction reserved for those who have served the nation in conspicuous fashion.

Kuwait, however, is not unique in the matter of friendly cooperation between management and employees. This spirit was likewise clearly observable among all ranks of the Arabian-American Oil Co. (Aramco) and those of the Iraq Petroleum Co., Ltd. and its associated companies, the Basrah Petroleum Co., the Mosul Petroleum Co., and Petroleum Developments (Qatar) Ltd., as well as those of the Bahrein Oil Co., Ltd.

Porto Marghera Refinery, Italy

A new thermal reforming unit to process 300,000 tons per annum of naphtha and produce a high-octane motor spirit component has recently gone into operation at the Porto Marghera, Italy refinery, jointly owned by the Anglo-Iranian Oil Co., and Azienda Generale Italiana Petrol.

This will bring the refinery's production of motor spirit up to 280,000 tons per annum, which quantity will be further increased when a catalytic polymerization unit to handle the gases from the unit comes on stream in 1953.

Since 1947, when the present holding company Industria Raffinazioni Olii Minerali was formed by AIOC and AGIP, the refinery's capacity has been raised from 450,000 to over a million tons and is scheduled to be increased to 1½ million tons in 1953.

British Equipment Orders

The following statement supplied by the Council of British Manufacturers of Petroleum Equipment gives the value of orders placed in the United Kingdom during July-September 1952 for materials and equipment:

1. Geophysical and other exploratory equipment, etc.	£ 8,500
2. Specialized equipment for oil drilling and production, including oil casing, tubing and drill pipe, etc.	3,732,200
3. Specialized equipment for oil refineries etc. (not including pumps and valves).	505,500
4. Drum and can-making, filling and cleaning equipment, curbside pumps and other oil metering and dispensing equipment.	298,800
5. Railcars, road tankers, aircraft refuellers, etc.	176,800
6. Drums, drumsheets and tinplate	3,189,200
7. Tankage (including tank fittings).	1,294,200
8. Tubulars, pipe fittings and valves (ferrous and non-ferrous).	5,395,600
9. Pumps, (excluding slush, oilwell and curbside).	344,700
10. Boilers, boiler house plant and accessories, etc.	128,500
11. Electrical equipment — motors, generators, transformers, etc.	1,397,100
12. Instruments, meters and gauges, etc.	280,200
13. Prime movers and compressors.	306,100
14. Machine and hand tools, welding and miscellaneous machinery and stores.	1,443,800
15. Ferrous and non-ferrous plates, sections, sheets and bars.	924,400
16. Automotive equipment, all types.	1,008,600
17. Laboratory equipment and chemicals including hospital and medical supplies.	121,600
18. Bulk chemicals, catalysts, barites, etc.	2,626,700
19. Cement and other building materials and hardware, including timber.	904,000
20. Commissary, general requisites for office, warehouse, household, club and sports, etc.	904,700
	£24,991,200

This brings the total for the three quarters to September 30 to £69,920,500, against a total of £83,991,400 for the four periods of 1951.

All Middle East Shares Growth

Production of the Iraq Petroleum Co., Ltd. and its associates reached a further high in November with the following totals:

	Production Nov. 1952 (Long Tons)	Current Total 1952 (Long Tons)
Iraq Petroleum Co. Ltd. (Kirkuk field)	1,555,803	13,844,339
Basrah Petroleum Co., Ltd. (Zubair Field)	239,516	1,985,507
Mosul Petroleum Co., Ltd. (Ain Zalah Field)	84,710	170,596
Petroleum Development (Qatar) Ltd., (Qatar field, Persian Gulf)	305,482	2,922,803
TOTAL	2,185,511	18,923,245

The above represents a daily average of 546,000 barrels for the Iraq growth in November, practically a doubling of its output since the opening of new fields and its large diameter pipeline early in 1952.

Production from the fields of Aramco during November was 3,097,000 tons (a daily average of 764,120 barrels) making a total for the first eleven months of 1952 of approximately 39 million tons. Thus, there is a total of approximately 92 million tons from the three main producing companies in the first eleven months of the year, which should ensure over one hundred million tons for the total 1952 production.

The production in 1950, the last full year of the working of the Anglo-Iranian Oil Company's Persian fields, was just under 82 million tons, so it would appear that this loss has been made up and there is no longer any major demand for crude oil from that quarter, particularly in a buyer's market such as now prevails.

Financial Notes

A public issue of £20 million, 5 percent debenture stock, 1974/78, at an issue price of £98.5 offered by Anglo-Iranian Oil Co. was promptly subscribed. The company has a large program of capital expenditure over the next three years for the construction of tankers, the completion of refineries and for oil exploration.

Expenditure for 1953 is estimated at £75 million, which it is anticipated will be met from the company's present resources, the proceeds of this issue and retained profits.

Apex (Trinidad) Oilfields Ltd. has increased its distribution of profits for 1951/52 by payment of a final dividend of 1/9 per 5/- unit of stock, making 2/3 for the year against 2/- for 1950/51.

B. R. Fraser

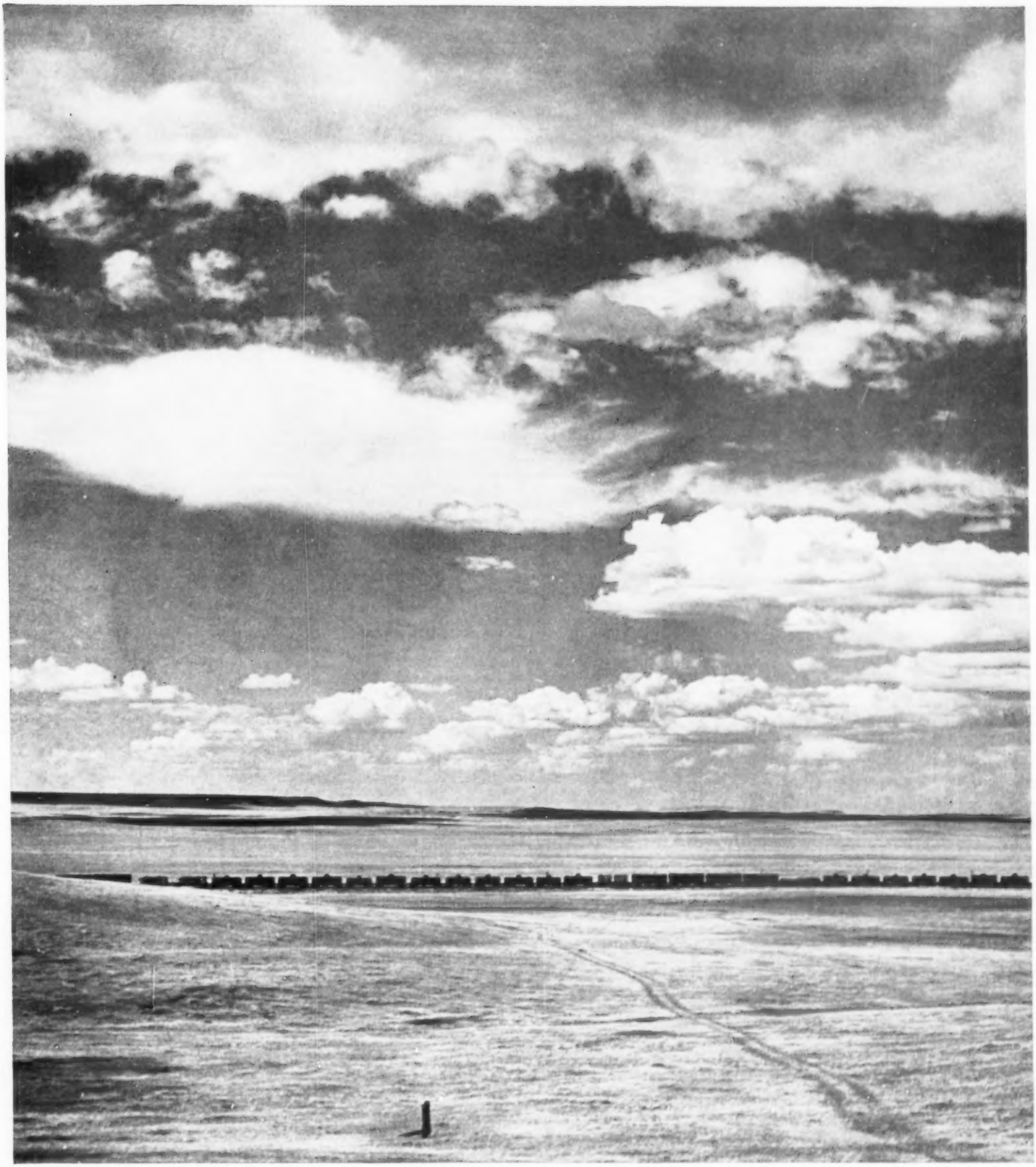
Personnel

Vacuum Oil Co., Ltd. has announced that B. R. Fraser has been appointed assistant refinery manager at the new £12 million refinery now nearing completion at Coryton, Essex. Mr. Fraser joined the Burmah Oil Co. in 1927 as plant chemist at the Digboi refinery in Upper Assam, India. In 1945 he was appointed assistant refinery manager and later became refinery manager.

For reasons of health, A. J. Palmer has vacated his seat on the board of directors of Vickers Ltd. and also retired from the boards of other companies in the group.

Dr. G. M. Lees, chief geologist of the Anglo-Iranian Oil Co., has been elected president of the Geological Society of London for the second year in succession. Dr. Lees joined the Anglo-Iranian Oil Co. in 1921 and has accumulated wide experience in geological exploration surveys in many parts of the world, with the Middle East as his principal interest.

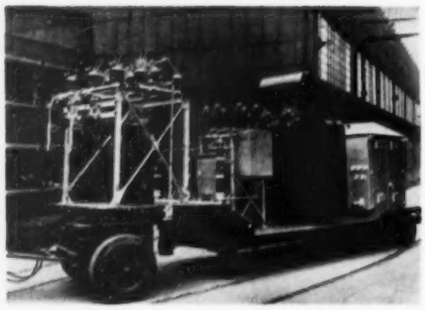
Dr. G. M. Lees



"The whole oil transportation network exists solely to serve the consumer. His needs are served best by many methods, competing among themselves to make all deliveries more efficient. The fact that pipelines can vie with one another, that tankers actively compete for business, that tank cars and transport trucks are working to prove their superiority to the other, means that customers are better off all around."

STANDARD OIL COMPANY (NEW JERSEY)

AND AFFILIATED COMPANIES



View of new complete electrical sub-station mounted on its trailer.

Mobile Power Unit for Venezuela

A complete electrical sub-station, mounted on wheels and weighing nearly 40 tons, will be used to augment or partially replace the plant at any of the 14 sub-stations in Shell's oil fields along the shores of Lake Maracaibo. In addition to being completely mobile at short notice, it can be used to provide a temporary supply to undeveloped parts of the oil fields not supplied from permanent sub-stations.

The main power transformer is a 4,500 kva 3-phase unit having a no-load ratio of 33/6.9 kv connected delta/delta and provided with an off-load tapping switch. There is also an auxiliary 15 kva single-phase 33/0.23 kv transformer for local lighting and power, both units having been manufactured by C. A. Parsons & Co., Ltd.

The main switchgear is of Reyrolle & Co., Ltd. design and manufacture, consisting of one 33-kv outdoor type circuit breaker of 500-kva rating and a steel kiosk having three compartments, one of which houses two 6.9 kv metaclad feed circuit breaker panels connected via roof bushings on the kiosk to the L.V. side of the main transformer by means of flexible cables. The second compartment contains the control and protective equipment for the 33-kv circuit breaker in addition to housing the tripping battery which is rectified charged from the 230-volt supply. The third compartment contains the control, protective and metering equipment for the 6.9-kv circuit breakers. External plug points are incorporated on the kiosk for the local lighting and power supplies.

The 33-kv lightning arresters, of General Electric Co., Ltd. manufacture, are mounted on resilient floor pads and the 33-kv line isolator and fuse isolator (the latter for controlling the auxiliary transformer) were made by Switchgear & Equipment, Ltd. The whole of the equipment is mounted on a 40-ton flat, low bed type trailer made by R. A. Dyson Co., Ltd.

Shell Concessions in Persian Gulf

An immediate start of exploratory operations is planned on the new underwater concession covered by an agreement recently concluded between the Shiekh of Qatar, H. E. Shiekh Ali bin Abdulla bin Qasim al Thani, and "Shell" Overseas Exploration Co., Ltd.

The area extends into the Persian Gulf outside territorial waters, and the concession is the first actually granted on the basis that, if oil is eventually discovered in commercial quantities, a 50-50 agreement would apply.

Petroleum Development (Qatar) Ltd., an associated company of the Iraq Petroleum Co., Ltd., holds the concession for the land and territorial waters of Qatar and is already producing crude oil in quantity, the production for the month of November 1952 being 305,452 tons.

Fawley's Poly Plant On Stream

The catalytic polymerization plant to deal with the gases produced in the Fawley cat cracker has gone on stream. It is designed to reduce the waste gas hitherto produced in the refinery, and will materially increase the production of high octane material for blending to make premium grade gasoline which will be available to motorists generally on February 1.

Regent Oil Co., Ltd.

A new ocean terminal is being built by Regent at Canvey Island on the Thames in order to deal with its increasing storage requirements, and is scheduled for completion during the current year. It is being built on land adjacent to that of London & Coastal Oil Wharves, with which the company already has a storage agreement, and with which company storage stocks will be interchangeable. Plans call for the erection of a new jetty in the River Thames with a deep water berth of about 40 feet minimum at low water spring tides, so that ocean tankers of 30,000 dwt can be accommodated at all times, together with a second jetty for loading coastal tankers and barges. On both jetties the form of construction will be steel box piles with reinforced deck beams and pre-stressed decking.

At the present time, 25 storage tanks are being erected with capacities varying in size from 500 to 4,000 tons, and they will be enclosed by reinforced concrete bunds. A million gallon reservoir is being constructed for the supply of water for fire fighting. The ring fire main which surrounds the site will be serviced by 4 pumps of 2,000 gallons per minute capacity.

Reject U. S. Demand for Oil Data

Demand of the federal government of the United States addressed to British and Dutch oil companies for production of all their records of oil transactions over the past twenty-four years, including all business done outside the United States as well as within this country, has been rejected by the governments of the Netherlands and Great Britain. The information was wanted for use in the so-called "cartel" investigation which charges five American and two European companies with participation in monopolistic practices in the international field.

In a letter addressed to the State Department of the United States, Foreign Secretary Anthony Eden confirmed the previous ruling of Geoffrey Lloyd, British Minister of Fuel and Power, that the Anglo-Iranian Oil Company should not submit documents which were not in the United States and did not pertain to American business, stating that aside from the jurisdiction of the United States, such disclosures in the opinion of the British government "may prejudice or endanger the economic and strategic interests of Her Majesty's government and of the western powers."

Kwinana Refinery

Work was officially begun in October on the new Australian refinery of the Anglo-Iranian Oil Co. at Kwinana. The capacity will be three million tons of crude per year and cost is estimated to be about £40 million.

The Kellogg International Corp. is directing the engineering of the refinery, and erection is being carried out by a number of British contractors headed by Costain-John Brown, Ltd. Most of the equipment will be fabricated in the United Kingdom, but some of the parts, including piping and reinforcing bar steel, will be of Australian manufacture. A single L-shaped jetty, with three separate tanker berths capable of accommodating super-tankers, will be built in Cockburn Sound to serve the refinery. Electrical power for the refinery, which is scheduled to commence operation in 1955, will be drawn from the Western Australian State Electricity Commission's network.

In connection with the refinery, a new private company, the Australian Petroleum Refinery Ltd., has been formed, the directors of which are all members of Anglo-Iranian's board.

"Klingerit" Ring Cutting Machine

Richard Klinger Ltd., Sidcup, England, has developed a ring cutting machine by which it is possible to cut jointing rings up to an outside diameter of 48 inches down to a minimum inside diameter of 2 inches, taking less than 20 seconds to cut a joint ring of 24 inches diameter and 1/10 inch thick. Its weight is only 14 lbs (6.5 kg.) and it can thus be easily moved.

Urge Higher U. S. Crude Level

(Continued from page 37)

practical reserve capacity."

The concern of government with the problem is indicated in three other reports from top-level planning agencies. The reports give public recognition to the problem for the first time, although the matter has been under active study for many years.

As far back as last summer came a report from the President's Materials Policy Commission, of which the chairman was William S. Paley, president of the Columbia Broadcasting System. The Paley report suggested government action looking toward wider well-spacing, slower withdrawals, and setasides in the tidelands, if not elsewhere.

Commenting in approval upon this, the Interior Department, in a report signed by Secretary Chapman on December 9, said, "Securing the equivalent of an oil stockpile is a matter of the highest urgency and the department will make strenuous efforts to achieve this objective . . . The department is not able to perceive the details of a workable solution to this problem, but recognizes the problem as crucial to the achievement of the commission's aims, and one on which considerable study may be required."

The latest report from the National Security Resources Board is perhaps the most important, and certainly the most revealing. It suggests, first, an Interior Department study of the problem. Among subjects for study, it proposes government loans for oil exploration, government purchase of crude oil in proven reserves, wider well spacing and a tidelands setaside. Presumably, the government purchase of reserves would remove that much oil from active markets, leaving oil men with the incentive to hunt for more petroleum. In time of war, the idea goes, the government's reserves would be ready for immediate use against mounting demands.

"Among the resources that cannot conveniently be stockpiled in the customary sense of that term," said the board, "is petroleum. As requirements for petroleum are much greater in wartime than in peace time, some alternative method of providing a reserve for military use should be devised."

The outgoing administration is the sponsor of these reports, but there is widespread evidence that the problem is non-political within the government agencies. At the capitol, further, there are indications that some Republican leaders would be even more receptive to government programs for larger reserves than were the Democrats. Rep. Dewey Short, (R., Mo.), the new chairman of the House Armed Services Committee, is for some program. When he last headed the committee some years ago, he put out a report scolding the military for failure to start a "sound petroleum stockpiling program." During hearings before the committee, Short heard suggestions for shutting in domestic oil in favor of using oil imports, for pumping imported oil into abandoned wells for storage, and for government buying of proven reserves.

Obvious handicaps to petroleum progress to the contrary—such as steel shortages, price controls, oil strikes and the temporary effect of the Iranian oil shutdown—the heart of the reserves problem is regarded as economic. The petroleum industry just cannot afford to maintain more than a certain amount of reserve capacity in standby. Just how large a reserve it can maintain is a subject of question. If the government planners are for even larger reserve capacity, some new device must be set up, according to petroleum planners. Whether the petroleum industry would approve or object to a new plan depends upon the plan itself.

In summary, therefore, there is a feeling in Washington that a larger reserve—of crude oil, pipe line capacity, refineries, tankers—is needed in America; that the best way to get it is yet to be found, but that the government may step in with some scheme; that the whole problem is intimately linked with oil imports; that the changeover from Democratic to Republican rule in Washington may have little effect on the outcome of the problem.

In the United Kingdom, where Anglo-Iranian operates the only producing oilfield (at Eakring, in Nottinghamshire), the Company has recently spudded in an exploratory well on the Isle of Wight, using a 136ft. derrick.

ANGLO-IRANIAN OIL COMPANY, LTD., with its subsidiary and associated concerns, is one of the major units of the world petroleum industry.

Its principal sources of crude oil production are in the Middle East. Through its prospecting subsidiary, the D'Arcy Exploration Company, it is interested in oil-bearing territories in many other parts of the world.

The Company operates refineries in Great Britain, France, Belgium, Germany, Italy, Israel and Australia. Distribution and marketing of oil products are effected both by the Company itself and through various associated companies. For sea transport its shipping subsidiary, the British Tanker Company, operates one of the largest fleets of ocean-going tankers. The Company's principal research establishments are in Great Britain, at Sunbury in Middlesex, and at Kirklington in Nottinghamshire.

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INTERNATIONAL NEWS AND NOTES

Expansion in Saskatchewan

Sohio Petroleum Co. and Socony-Vacuum Exploration Co. have signed an agreement involving an expanded exploration and drilling program in Saskatchewan. Socony-Vacuum will acquire from the Sohio group an undivided one-half interest in approximately five million acres of land in the Province of Saskatchewan in which the mineral rights are the property of the Crown. Socony-Vacuum, as operating manager, will carry out operations at a high level of exploration and test drilling under a program planned to extend over the next three years. The agreement has been approved by the Hon. J. H. Brockelbank, Saskatchewan Minister of Natural Resources.

Sohio has been conducting oil and gas exploratory operations on these lands since 1949 as operating manager for a group of seven companies: Chicago Corp., Texas Gulf Producing Co., Midstates Oil Corp., Republic Natural Gas Co., Union Sulphur and Oil Co., Bradley Producing Co. and Sohio.

Sohio will continue to headquarter its management and operating personnel in Regina, Saskatchewan for exploratory operations on these leases and to cooperate with the Socony-Vacuum program on the Crown lands.

Holdings of the Sohio group will consist of a half interest in about 5,400,000 acres of Crown lands and the entire interest in approximately 1 600,000 acres of privately-owned lands held under oil and gas leases. Socony-Vacuum contemplates a substantial addition to its technical and operating personnel in Saskatchewan commensurate with the expanded operations.

Mexico To Build Big Distribution Plant

In January, Petroleos Mexicanos will break ground for what is claimed to be the world's largest oil distribution plant. The project will cost 53 million pesos exclusive of the site and will serve simultaneously 70 railway tank cars and 50 auto tank cars. It will be erected on a part of the 160 acres owned by Pemex which borders the south side of the refinery at Atzcapotzalco.

Apart from its capacity, the new plant is a decided step forward in the history of Mexico's oil organization. It will be the first project of importance entirely engineered and constructed by Mexicans. Sole designer and builder is Ing. Jose Renteria, one of Mexico's distinguished engineers. Renteria occupied the post of construction engineer for the Salamanca refinery which is regarded as most modern in its equipment.

The distribution system will handle the combined operations of the Nomoalco, Vallejo, Cristema and Atzcapotzalco Embarques y Reparto center, all located in the Mexico City zone. Much machinery will be purchased in the United States including a million dollars and more of pumps and about the same amount of big storage tanks.

Modern efficiency will prevail throughout. Over six million gallons of fuel can be pumped in eight hours. There is an entire plant devoted to filling drums with special mixtures, including asphalt, another plant for making lube oil, a third to treat special carton products for roofing, and a fourth to manufacture liquid and powders for killing vermin.

A freight station and extensive switchyards will provide speedy access to every railway line. Both the Mexico-Laredo and Mexico-Acambaro railway tracks border one side of the plant.

Extensive repair shops, laboratories, administrative offices, dining rooms and a recreation center dedicated to outdoor sports will be built. The unused section of the big tract of land will be made into a park for future expansion of both refinery and distribution center.

Venezuela Drilling Operations

The number of rigs operating in December in Venezuela was 116, an increase of eight over a year ago. Mene Grande was operating 34, Shell 30 and Creole 18. In Western Venezuela 47 were working, 38 on development drilling and nine on exploration. In Eastern Venezuela 69 were working, with 50 on development drilling and 19 on wildcats. 1948 still remains the peak year for Venezuela, when 138 rigs were running at the end of the year.

Production for November was 1,814,458 b/d or 16,000 b/d more than the average for the year. October was the second lowest month of 1952, with a total of 1,768,502 b/d broken down by operators as follows:

	Eastern Venezuela	Western Venezuela	Total
Creole	124,165	662,702	786,867
Shell Co.'s	——	497,188	497,188
Mene Grande	263,312	52,082	315,394
Socony-Vacuum	59,038	——	59,038
Texas-Mercedes	32,695	7,268	39,963
Richmond	——	20,482	20,482
Atlantic	17,625	——	17,625
Sinclair	13,230	——	13,230
Phillips	9,029	——	9,029
Pantepec	8,758	——	8,758
BCO, Ltd.	——	——	928
	527,852*	1,240,650	1,768,502

*Includes 42,128 barrels from State of Guarico.

In one week of December, Creole Petroleum's operated production rose to a new all-time high of 819,000 b/d.

Named to Mene Grande Executive Committee

Dr. L. Herrera F.

Dr. Luis Herrera F., assistant to the president of the Mene Grande Oil Company, C.A., third biggest operator in Venezuela, has been named to the executive committee of the company. Dr. Herrera graduated as a civil engineer from the Central University of Venezuela in 1929. He first went to work for the old Paraguana Petroleum Corp., a Cities Service subsidiary, and then for the Ministry of Development, where he was technical inspector-general of hydrocarbons. In 1938 he graduated as a petroleum engineer from the University of Texas. Returning to Venezuela, Dr. Herrera resumed the post of inspector-general. Five years later, when the office was created, he became director of the Technical Office of Hydrocarbons. He was twice Acting Minister of Development of his country. In 1946 he joined Mene Grande as executive assistant, becoming assistant to the president in 1949.

Stockstadt Oil Discovery

Gewerkschaft Elwerath's wildcat Stockstadt 1 has struck oil in the Pechelbronn layers of the Lower Oligocene at a depth of 5,300 feet. The well is east of the Rhine near Darmstadt. During production tests the well flowed 168 barrels of light crude oil daily through a 2 mm choke and 420 barrels through a 3 mm choke. At the well head an average pressure of 600 psi was measured. Despite its relatively low specific gravity, the oil is very paraffinous and has a high pour point (+ 20°C).

The success of this well is of particular importance because this is the first time that oil-bearing layers of the Alsatian Pechelbronn have been encountered in the Upper Rhine valley as far north as this. This is also the first instance of a structure in the center of the Rhine graben having been found to contain crude oil in commercial quantities. The discovery of the Stockstadt pay and the gas find of Pfungstadt are giving a new impetus to the search for oil in the Upper Rhine valley.

Oil Quest in East Africa

D'Arcy Exporation Co., in conjunction with Royal Dutch/Shell, plans to start shortly, under license from the respective governments concerned, a comprehensive program of geological and geophysical surveys in the quest for oil in East Africa.

A preliminary air-photo survey is now being undertaken by three aircraft charted from Hunting Aerosurveys, Ltd.

Operations, based intitially on Dar-es-Salaam, have been started over the coastal area of Tanganyika, and an air-photo coverage will later be made of Zanzibar and Pemba Islands and parts of Kenya which are of potential oil interest.

Geological and geophysical ground surveys of various islands off the East African coast will shortly be carried out by parties using the survey vessel 'Burgan," and will be followed by further detailed reconnaissances on the mainland.

Saudi Arabian Production

Crude oil production in Saudi Arabia during November 1952 amounted to 22,716,838 barrels, or an average of 732,801 barrels per calendar day, it is announced by the Arabian American Oil Company. Crude processed at the company's refinery at Ras Tanura amounted to 4,786,808 barrels, or an average of 154,413 barrels per day.

Crude oil production for the 12 months of 1952 amounted to 301,866,885 barrels, an average of 824,756 barrels per calendar day. Crude run in the refinery for the same period was 62,204,161 barrels, an average of 169,957 barrels per calendar day.

Barnes Opens Canadian Office

W. M. Barnes Company of Canada Ltd., an affiliate of W. M. Barnes Company of Los Angeles, has opened an office in Toronto for the more efficient handling of the company's increasing activities in the petroleum and chemical industries of Canada. For several years the Barnes organization has carried on construction work in Canada with engineering and purchasing handled from Los Angeles. The new arrangement provides complete service from either office.

Fred J. Underwood is general manager of the Canadian company and H. B. Williams is engineering manager. Contracts aggregating several million dollars are now being carried out for various Canadian companies.

Potential Orinoco Development

A leading Caracas newspaper points out that the middle Orinoco might come in for a big development if oil in quantity is ever found in the Apure-Barinas area where Sinclair is currently rigging up on Sinco-1, its first wildcat in this region since 1931.

Socony-Vacuum has completed several wells in Barinas and bought land a year ago for a terminal and refinery site at Puerto Cabello, but is said to be taking no further steps to connect the two points with the necessary 250-mile pipeline until and unless more acreage is obtained from the Venezuelan government to assure that the project will pay out.

The newspaper suggests that the river route might prove to be the best way to get out the possible future oil of Apure-Barinas, in which case the Orinoco might be dredged upstream to the mouth of the Apure River. The newspaper added that the greatest benefit to Venezuela from the iron-ore mining has proven to be not the royalties, but the dredging of the lower reaches of the Orinoco.

New Canadian Refinery

Refinery Operators Ltd., Calgary, Alberta, will build a 5,000-barrel crude oil topping plant at Coleville, Saskatchewan. Construction of the plant has already started on a 80-acre tract leased from Royalite and it is planned to have the refinery on stream by April 1, 1953.

Under the agreement, refinery operators will finance, construct and operate the plant which will process crude from the Coleville heavy oil field. Lincoln Clark of Clark & Gosselin, Long Beach, Calif., will act as engineer, while E. B. Lay, president of Refinery Operators, will supervise general construction work. At the present time there are 60 wells in the Coleville field producing or capable of producing 14 degrees API gravity crude oil.

The major interest in these wells is owned jointly by Royalite Oil Company, Ltd. and Canada Southern Oils Ltd., with Royalite being the field operator. It is planned to drill additional wells to meet the refinery demand.

Year-End Profit Sharing

Venezuela oil companies recently put about $30 million into the hands of their personnel under a government-sponsored profit-sharing scheme. This is equivalent to two months' extra pay for all hands. Shell and Creole distributed about $8 million each, Mene Grande $4 million, and the other seven or eight companies will together give about $10 million.

Taxes Pemex Ten Percent

In one of his last official acts, outgoing President Miguel Aleman, who turned over his duties to his successor, Adolfo Ruiz Cortines, on December 1, presented a bill in the Mexican Chamber of Deputies slapping a ten percent tax on the gross income of Petroleos Mexicanos. Funds will be used to pay for expropriated properties at first.

In place of the regular monthly meeting of the Houston chapter of Nomads, a barbecue was held for members and guests at the Texaco Country Club in October. Pictured from left to right are Nomad Jack A. Barnes, Trinity Portland Cement Co., barbecue and tournament chairman; and foreign guests M. G. Erhard, International Petroleum Co., Talara, Peru; and Ing. Ivan Carvalho, Brazilian Government Oilfields, Bahia, Brazil.

Mexico Plans Oil Expansion

Senator Antonio Bermudez, director general of Petroleos Mexicanos, one of the few holdovers of the Aleman administration to be reappointed to his post, has issued a report on the progress of the Mexican oil industry during the term of the retiring president. In it he revealed that crude production had almost doubled, that 33 new fields have been discovered, that reserves have risen 100 percent and that great advances have been made in refining and transportation facilities.

Looking to the future, Senator Bermudez declares that even greater advances must be made during the coming six years.

"First of all," Senator Bermudez said, "we believe domestic consumption of oil products will increase at least seven percent annually, which means 217,000 barrels daily by 1958. We foresee an export program with annual increases of 20 percent, or 221,000 barrels a day by 1958.

"To carry out this program, increase in production of crude from both known fields and those yet undiscovered will have to reach 12.5 percent annually, or a production of 460,000 barrels a day by 1958.

'If this is to be realized, we will have to increase exploration on one hand, and drilling on the other to an annual minimum of 400 wells in 1953 and 425 by 1958.

"At present, we have a large reserve of natural gas in northeastern fields, which will be increased with the results of exploration and drilling in that area. It is necessary to encourage consumption of this fuel in the national market and promote export sales to obtain profits from investments in this branch of the industry. Present prospects and drilling plans point to discovery of new and important gas reserves during the next six years.

"Investment of one billion pesos will be required in the next six years for transportation of oil and gas and complementary installations for development of fields, construction of oil and gas pipelines and amplification of those already in existence, pumping stations, plants for treatment of gas, systems for storing crude, electrification projects, water treatment plants, miscellaneous buildings, installation of new refineries in key zones and construction of storage and distribution plants. It will also be necessary to replace some units of the oil fleet and to repair others.

"From a social standpoint, it is imperative to maintain the magnificent relations between management and labor which are the basis of efficiency in the industry. Special attention should be paid to promotion of programs to aid workers to obtain their own homes, a problem which has not received sufficient attention.

"Industrialization demands an effective and abundant fuel supply as one of its foundations. Undoubtedly the demand will be constantly greater and for this reason the oil industry will have to continually exceed itself."

BCO Changes Ownership

Acquisition of the properties and oil concessions of British Controlled Oilfields in Venezuela as of December 1 by an American syndicate has been announced. Members of the syndicate include C. W. Murchison of Dallas, Texas; Cecil V. Hagen, Houston, Texas; G. L. Ohstrom Associates and Roy B. Kelly of Washington, D. C. The new owners will operate the company under the name of Talon Petroleum C.A. The properties involved consist of 9,000 acres in the Lake Maracaibo area with current production of about 950 barrels daily.

Houdriflow Unit for Japan

Houdry Process Corp. and its foreign representative, World Commerce Corp. S.A., New York, announce that Daikyo Oil Co. Ltd. of Tokyo will install a Houdriflow catalytic cracking unit in its refinery at Yokkaichi, Japan.

The new unit, the first to be installed in the Orient, is designed for a gross capacity of 4,200 barrels per day. Engineering for the installation will be furnished by Houdry Process Corp. and construction will be handled by a Japanese firm.

H. A. Jarvis *L. E. Lowry*

Creole Names Executives

H. A. Jarvis and L. E. Lowry have been named by Creole Petroleum Corp. as director and comptroller, respectively, to fill the vacancies left by the resignation of I. R. Cunningham, who has accepted a position with the producing coordination department of Standard Oil Co. (N. J.).

Mr. Jarvis has been with Creole and other Jersey affiliates since 1930, when he was employed in Esso's Bayway refinery as a student engineer. From Bayway he went to the Compana Refinery in Argentina, where he spent 15 years and ultimately became president and general manager. He came to Venezuela in 1947 as assistant manager of the refinery department of Creole, and the following year was appointed manager of the Amuay Bay refinery. He became a member of Creole's management committee in March, 1950. Mr. Jarvis is presently manager of the western division of Creole Petroleum Corp., with headquarters at Maracaibo.

Mr. Leo Lowry joined the Carter Oil Co. as a junior clerk in Tulsa in 1937. He came to Venezuela as an accountant in 1938 and has remained in Venezuela since that time. He is at present assistant comptroller and manager of the accounting department of Creole, with offices in Caracas.

Spuds Second Pakistan Well

Pakistan Petroleum Co. Ltd. spudded its second well at Sui on December 19, 1952 in the presence of His Excellency Mian Aminuddin, acting governor of Sind. The first well drilled at Sui was a substantial gas producer. The second is a five mile step-out to determine the extent of the find.

In addition to the Sui well, the company now is drilling two major tests in East Pakistan. A deep well at Chak Naurang in the Punjab was recently completed as an oil producer.

Oil Outlays Boon to Canadian Port

A main beneficiary of oil company spending in the Vancouver areas of British Columbia during the coming year will be the 42-mile square municipality of Burnaby. Within this area is included the sites of several new refineries and the terminal facilities of Trans Mountain Pipe Line.

The building program includes the 200-acre Trans Mountain tank farm, the $10 million Shell refinery addition now under way under the direction of Fluor's Harvey Vann; the 75-acre site of Standard and the 200-acre tract of British American. A million dollars of additional pipe line construction will be required to service refineries and shipping terminals from the tank farm, a contract that is being handled by Missouri Valley Canadian of Winnipeg.

Prospects are that oil company expenditures in the Burnaby district in 1953 will be fivefold those of the past year. This outlook is welcomed by Burnaby officials who point out that a refinery project such as that of Shell, for example, adds as much to tax returns as 400 homes without corresponding requirements of schools and other services.

First oil refinery in the interior of British Columbia will be built at Kamloops, some 280 miles from Vancouver. Plans are now being drawn for the $3 million plant which is expected to be under way this spring. It is the first interior industrial development directly traceable to the building of the Trans Mountain Oil Pipe Line.

OIL COMPANY STAFF CHANGES

R. J. S. PIGOTT, director of engineering, Gulf Research & Development Co., retired on January 1. He will, however, continue in the capacity of consultant.

Mr. Pigott has compiled a notable record in the engineering field since graduating from Columbia University in 1906. He holds more than 30 patents and has contributed more than 40 papers to technical literature. He has just completed his term as president of the American Society of Mechanical Engineers. He is a past president of the Instrument Society of America, of the Society of Automotive Engineers, and the American Society for Measurement and Control.

DR. CARL O. TONGBERG has been appointed director of the research division of the Esso Laboratories of Standard Oil Development Co. Dr. Charles L. Fleming, Jr. was made associate director and Gordon W. Duncan an assistant director of the same division. The company also named two new section heads in its research division. Dr. Joseph P. Hamer is to head the automotive fuels and lubricants section, and Elfried F. H. Pennekap the additives section. George S. Tobias assumes new responsibilities as aviation contact representative.

E. TOPANELIAN, JR. has been appointed director of engineering and Bruce R. Walsh assistant director of engineering of Gulf Research & Development Co. J. Edward Taylor, formerly a member of the product development and product engineering department of the Gulf Companies, has been transferred to the research department as director of automotive engineering, with Charles R. Butler and R. L. Kirkpatrick as assistants.

CHARLES P. BAKER has been appointed vice chairman of the manufacturing committee of Socony-Vacuum Oil Co., Inc., succeeding George S. Dunham, who was recently elected a director. Mr. Baker has been a member of the manufacturing committee since February 1, 1952. Before that he was manager of Socony-Vacuum's East St. Louis, Ill., refinery, a post he had held since 1946. He joined Magnolia Petroleum Company, Socony-Vacuum affiliate in the southwest, in 1934.

LYLE CASPELL has been appointed managing director of Empire Petroleums Limited, Calgary, and of Texas Calgary Limited. Mr. Caspell has for 13 years been superintendent of production for Pacific Petroleums and associates. Empire is one of the group of companies linked with Pacific Petroleum in Peace River gas and oil development.

JOSEPH P. WALSH, general counsel of Sinclair Oil Corp., has been elected chairman of the American Petroleum Industries Committee of the American Petroleum Institute. He succeeds Cyrus S. Gentry, vice president and general counsel of Shell Oil Co., who has retired from his company.

WILLIAM H. BURNS, associate editor of Sun Oil Company's quarterly house publication *Our Sun* has been named its editor, succeeding William J. Getty. Mr. Getty has been promoted to the public relations department's special events division.

T. S. DU BOISE has been appointed district manager of Ethyl Corporation for New Orleans. He succeeds Alan C. Tully, who has been promoted to assistant manager of the southern region, with headquarters in Tulsa.

WILLIAM F. KENNEY has been appointed vice president and general counsel of Shell Co. to succeed Cyrus S. Gentry who retired the first of the year. Mr. Kenney has been general attorney in charge of Shell's New York legal department. He joined Shell in 1937 as an attorney in St. Louis.

R. F. PIELSTICKER will serve temporarily as general manager of crude oil supply and products pipe lines for Standard Oil Company of Indiana during the absence of R. E. Nelson, Jr., who has been granted leave to join the Petroleum Administration for Defense at Washington as director of the supply and transportation division beginning February 1, 1953.

Mr. Pielsticker was elected president of Stanolind Oil Purchasing Company in 1951 after 20 years' service with Skelly Oil Company in its marketing, sales, crude oil purchasing, and pipe line departments.

R. F. BAKER, vice president of The Texas Company in charge of domestic production, has been elected an executive vice president of the company. Mr. Baker has been with the company since 1916. He was made a vice president in charge of domestic producing operations in 1949, and has been a director of the company since August, 1950.

E. R. Filley, general manager of the domestic producing department, was elected a vice president of the company, in charge of domestic production, with headquarters at New York. Mr. Filley has been with the company since 1914 and was named general manager of the domestic producing department in 1949.

HOWARD G. VESPER, president of California Research Corp., has been elected a vice president of Standard Oil Co. of California. Mr. Vesper joined Standard of California in 1922. Following service in research and development at California Standard's El Segundo refinery, he worked as a salesman in foreign trade operations in New York City and then returned to Standard of California's manufacturing department. He was manager of gasoline and fuel oil marketing when he became president of Cal Research in 1946.

JOHN C. SAMPLE, a director of General Petroleum Corp., has been elected vice president. He will coordinate the company's manufacturing, pipe line, and supply activities.

R. O. Swayze has been elected vice president and director of production to succeed M. S. App, who retired after 40 years with General.

J. T. Durkee has been elected treasurer and a director, succeeding Wesley Cunningham who is also retiring. Mr. Durkee retains the post of comptroller.

A. D. Bennison, manager of the oil exchange and supply department, has been elected director of oil supply.

A. O. Woll, director of the company's marine department, is also retiring after 42 years' service. No successor director was named.

WILLIAM H. POWELL, who first went to work for the Macmillan Petroleum Corp. in 1924 as a roughneck at the Signal Hill refinery, has been elected vice president in charge of manufacturing and a director.

From 1937 to 1947 Mr. Powell was superintendent of the Signal Hill refinery and for the past five years has been in charge of Macmillan's El Dorado, Arkansas refinery.

Although he will divide his time between Arkansas and California, Mr. Powell will for the present maintain residence at El Dorado.

W. F. Kenney

R. F. Baker

H. G. Vesper

W. H. Powell

DR. FLOYD L. MILLER has completed his year's assignment in Washington, D. C. as vice chairman of the Research and Development Board of the Department of Defense. He has returned to Standard Oil Development Co. as manager of its contract, legal and patent department. Prior to his Washington appointment, Dr. Miller was head of the research division of the company.

A. D. CADMAN has been appointed manager of the industrial relations department of The British American Oil Co., Ltd. For the past seven years he has held key positions in the company's marketing organization in Ontario and Quebec.

MERWIN BRISTOL has been promoted from senior attorney in the law department to assistant general counsel of Standard Oil Company (Indiana). His office will continue to be at the company headquarters in Chicago, Ill.

Truman Tidelands Order Raises Hubbub

Apparently in an effort to forestall anticipated Congressional action confirming to those states bordering navigable waters ownership and control of offshore petroleum deposits, President Truman announced on January 15 that he would issue an executive order establishing such deposits as federal reserves under control of the United States Navy. As a reason for this summary action on the eve of his retirement from office, the President cited the necessity of maintaining for the nation all possible reserves.

Mr. Truman's order brought to the forefront the so-called tidelands issue which has long been the subject of controversy between the Truman administration and the representatives of a large group of states led by those with shore lines on the Pacific and the Gulf of Mexico, the areas most directly affected.

On two occasions the Supreme Court has rendered decisions which, while not covering the question of ownership, have asserted that the federal government has "paramount rights" over offshore oil. Twice Congress has passed bills quitclaiming to the states all rights of ownership and control of these submerged lands. Twice President Truman vetoed these bills. The issue figured in the recent presidential campaign during which the Republican candidate expressed himself as favoring state control and bills introduced at the opening of the present session proposed that Congress reaffirm its earlier position.

Supporters of the states were quick to point out that President Truman's order could be revoked by his successor or could be nullified by legislative action, the Supreme Court having stated that the matter is within Congressional jurisdiction.

Supporters of state claims in and out of Congress representing both political parties joined in quick denunciation of the Truman order, but insisted that it would be quickly reversed. In political circles it was suggested that the retiring President was laying up political capital for party use in future campaigns.

Urge Gas Taxes for Road Construction

At a conference held December 9 at Phoenix, Arizona, by governors of nine western States and two territories, it was recommended that all federal funds from gasoline taxation be devoted to highway construction and be handed over to the states in which they originated to be administered for this purpose.

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LEONARD W. GROCE has been appointed assistant treasurer of Humble Oil & Refining Company, with supervision over the banking section. His new duties, which he assumed on December 19, include the receiving and disbursing of company funds and the maintenance of relations between Humble and a number of banks.

Donald Lincoln

Donald Lincoln, manager of the refinery supply and distribution division of Sun Oil Co., died December 29, 1952 following an illness of several months. He was 57. Mr. Lincoln joined Sun Oil Co. in 1930 at the Marcus Hook refinery. He helped to organize the production control division during Warld War II and was named manager of the refinery supply and distribution division when it was organized in January, 1946.

GORDON H. LOVEJOY has been promoted to the newly created position of manager of product exchanges and supply for Continental Oil Co. M. A. Snodgrass succeeds him as superintendent of Conoco's order and distribution division.

Warren A. Sinsheimer

Warren A. Sinsheimer, 67, veteran Cities Service executive, died November 28 after a long illness. Mr. Sinsheimer, a native of San Luis Obispo, entered the oil business in 1907, following his graduation from the University of California. In 1917 he became associated with the Cities Service organization and for many years was manager of the oil pipe line and production department in New York. At the time of his death he was coordinator of economics for Cities Service.

P. L. Kartzke

MALCOLM P. MURDOCK has been elected a vice president and director of Ethyl Corp, Julian J. Frey has been named assistant vice president, and Harold R. Berg general manager of antiknock sales.

Mr. Murdock succeeds Sanford M. Wagner, who will retire as vice president and director in February. Mr. Murdock, who has been general sales manager for the past year, joined the company 20 years ago as a field representative in the New York division.

Mr. Frey has been with Ethyl 25 years serving first in the engineering department and later as manager of the technical service division in Detroit.

Mr. Berg has been manager of the Southern region in Tulsa for the past six years, having joined Ethyl as a field representative in Chicago in 1928.

PAUL L. KARTZKE has been appointed a vice president of Shell Oil Co. In his new capacity he will continue to direct Shell's search for oil reserves and the production of oil and gas in western Canada, with headquarters in Calgary, Alberta. He has been exploration and production manager for Shell Oil Company in the Calgary area and vice president of Shell Oil Company of Canada, Ltd.

Mr. Kartzke joined Shell in 1935 as a junior engineer in Ventura, Calif. shortly after his graduation from the California Institute of Technology, where he received his master's degree in civil engineering. After serving in various positions of increasing responsibility in the California oilfields, he was promoted to the post of division manager in the Rocky Mountain area in 1948.

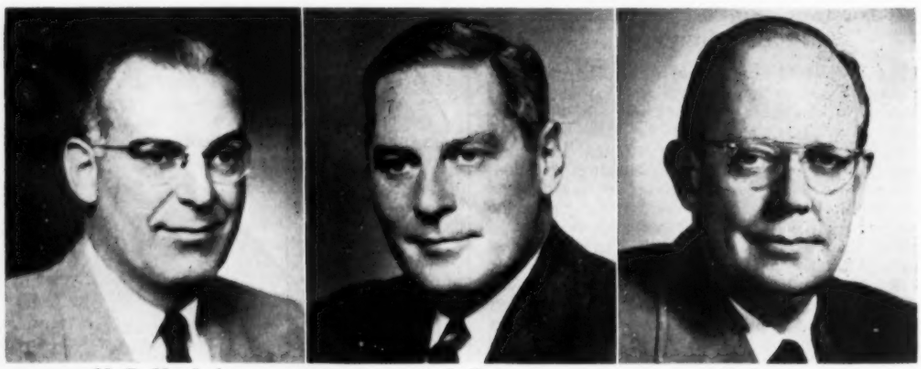
Among the operations under Mr. Kartzke's direction are the Jumping Pound gas field in Alberta and the gas treatment plant recently erected there for extracting sulfur and processing natural gas for home and industrial use.

Professorship Established

The V. N. Ipatieff Research Professorship in Organic Chemistry has been established at Northwestern University by Universal Oil Products Co., Des Plaines, Illinois. UOP plans to grant the university $25,000 a year for the professorship. The initial grant is for three years. The gift is in honor of the late Prof. Vladimir N. Ipatieff, internationally famous research chemist, who was director of chemical research at Universal and director of the High Pressure and Catalytic Laboratory at the Northwestern Technological Institute. Prof. Ipatieff died November 29, 1952 at the age of 85.

Appointed Platte Superintendent

Phil K. Johnson has been appointed superintendent of the tax, right of ways, and claims department for Platte Pipe Line Co. For the past four years he has been tax commissioner and budget director for the State of Nebraska.



M. P. Murdock *J. J. Frey* *H. R. Berg*

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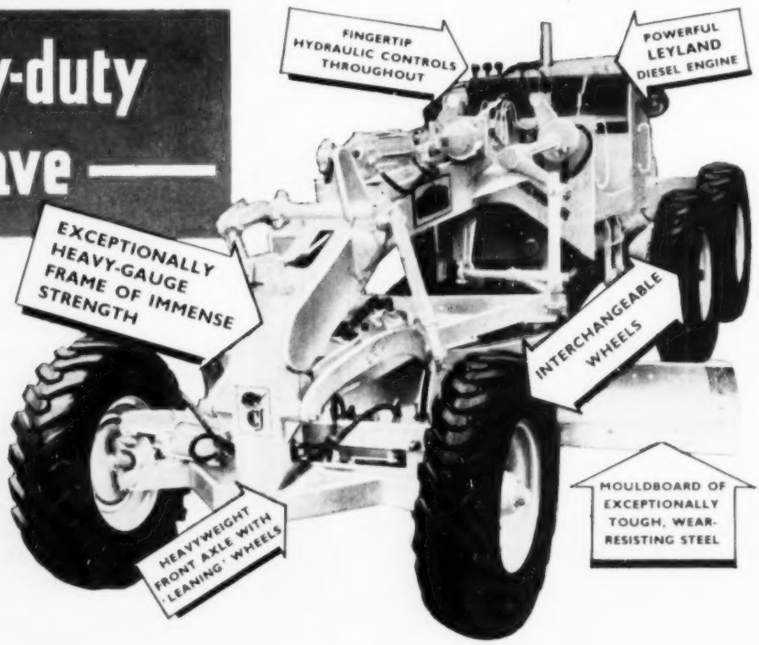
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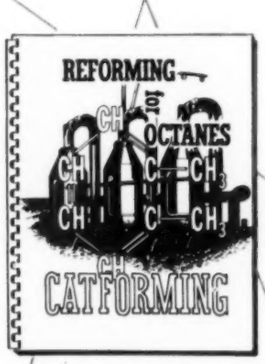

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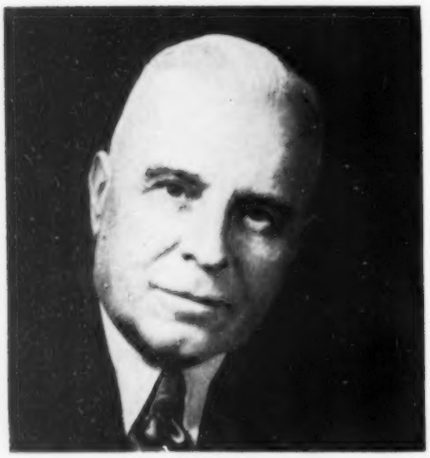

J. W. Moyer

JOHN W. MOYER has been appointed president and managing director of Home Oil Company, Ltd., replacing Robert B. Curran, who resigned. Alexander Clark of Casper, Wyoming, has been made a director and vice president in charge of exploration, and Alan H. Williamson of Vancouver, B. C. has been added to the board of directors.

In addition to his post with Home Oil, Mr. Clark is a director of Federated Petroleums, Ltd. and is vice president and managing director of Williston Oil and Gas Company. Mr. Williamson is vice president of Wood, Gundy & Company, Ltd. and a director of other Canadian corporations.

R. E. NELSON, JR., of Standard Oil Co. (Ind.), on February 1 will join the Petroleum Administration for Defense in Washington, D. C., as director of the supply and transportation division. He will be granted leave from his duties as Standard's general manager of crude oil supply and products pipe lines. He will succeed C. E. Spahr, vice president of the Standard Oil Co. (Ohio).

R. E. Nelson, Jr.

Lane-Wells Adds New Stations

As part of its campaign to make service available in all active oil fields, the Lane-Wells Company has opened three new stations in the United States and Canada. The Mid-Continent division has established a Glendive, Montana station with Charles L. Naus as superintendent. He has been associated with the petroleum industry since 1936 and has been employed by Lane-Wells since 1940.

The Gulf Coast division has opened a station at Winters, Texas. W. D. Copper, a Lane-Wells employee since 1946, is operator-in-charge, transferred from Wichita Falls, Texas.

The Lane-Wells Canadian Company has established a truck station at Virden, Manitoba with Joseph H. Donovan, formerly at Edmonton, in charge. He was with Canadian Gulf Oil Company before joining Lane-Wells.

Half-Century Gulf Veteran Retires

Charles R. Stevenson, veteran employee of more than 50 years' service with Gulf Oil Corp., retired December 31. Mr. Stevenson, an assistant treasurer of the corporation and plant manager of its Port Arthur, Texas, refinery, is retiring with a service record that has seldom been equalled in the annals of American industry. He has served Gulf for all but one-half year of its 51-year existence, all of that service spent at the Port Arthur refinery.

At the age of 15, Mr. Stevenson joined Gulf as an office boy at its Port Arthur plant. In 1929 he was made manager of the company's three refineries in Texas and manager of the Gulf Commissary Co. He was elected an assistant treasurer of Gulf Oil Corp. in 1938.

Reed Moves Ellis, Green

Rudy V. Ellis, formerly Louisiana Gulf Coast division manager for the Reed Roller Bit Company, has been transferred to Houston where he will manage the Texas Gulf Coast sales division. He will replace W. L. Childs, Jr., who was recently made sales manager of the oil tool division. William J. Green has been appointed manager of the Louisiana Gulf Coast division.

Joins Franks Export Group

Franks Manufacturing Corp. of Tulsa announces the appointment of Joe M. Rutledge as assistant export representative in the New York offices of A. V. Simonson, Franks Export manager. Mr. Rutledge will have offices at 149 Broadway, New York City.

Descale WITHOUT Danger

SKATOSKALO

Use AIR-DRIVEN "SKATOSKALO"

THE Air Motor "Skatoskalo" Set enables the operators to descale and clean tubes in the shortest possible time with the greatest efficiency. The air motor gives more horse-power and does not stall when heavy deposit is encountered.

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"Skatoskalo" equipment can be used with complete safety and is recommended for the efficient maintenance of cracking plant, boilers, evaporators, condensers, heat exchangers, etc.

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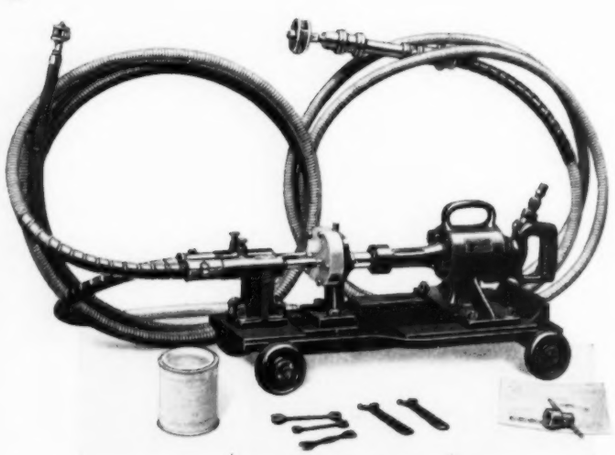

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More than 1100 are in operation throughout the world in the petroleum, chemical and allied industries . . . for all processes and for any duty, pressure, temperature and efficiency . . . and all Petro-Chem Iso-Flow Furnaces are pre-eminently satisfactory.

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D. J. Hall

Don Hall Rejoins McCullough

After an absence of two years, D. J. Hall has returned to the McCullough Tool Co. as regional sales manager for the Western and Rocky Mountain divisions. Don Hall first joined McCullough in 1942 as a salesman in the Bakersfield area. In 1945 he became sales manager of the Bakersfield district. In 1950 he joined the Great Lakes Corp. as regional manager of the California, Rocky Mountain, and Canadian divisions.

Reject West Coast Crude Rise

The proposal for an increase in West Coast crude oil prices was rejected by the Office for Price Stabilization on January 15. OPS Director Joseph Freehill said there was no basis for the requested price ceiling raise, but that other steps are available to relieve a Pacific Coast shortage. As alternatives, he mentioned a subsidy to producers or a special price for military purchases.

Porter Gives Year End Report

In a year end report reviewing the 1952 record of the oil industry in the United States, Frank M. Porter, president of the American Petroleum Institute, said that more crude oil, natural gas liquids, natural gas, motor fuel and distillate fuel oil were produced than in any other 12-month period. Refinery capacity and the amount of crude oil processed in refineries reached all-time peaks, and to help meet current demands and prepare for tomorrow's, a record-breaking number of wells were drilled.

These accomplishments called for the investment of more money than in any other single year, the industry's capital expansion program for 1952 providing for the expenditure of more than four billion dollars, an increase of nearly 25 percent over 1951.

The country's demand for petroleum is stated as 7,666,000 barrels daily with supply averaging 7,823,000 barrels. Refineries, with a capacity of 7,613,000 barrels daily, processed 2,436 million barrels of crude during the year. Of the refining capacity, 7,585,100 barrels daily was considered operable at the year's end.

The number of wells drilled in 1952 is estimated at 46 800, up 2,250 over 1951. Indicating the financial hazards with which oil producers must contend is the fact that 17 950 of the wells were dry holes.

No report is yet available on the amount of new oil discovered in 1952, but proven reserves undoubtedly were increased again as a result of the record-breaking level of drilling operations. At the beginning of 1952, proven reserves of liquid petroleum were estimated at 32 billion, 192 million barrels, an all-time high.

Mixer Bulletin

A six page bulletin on the Shortstir side entering mixer, a fluid agitator for use in pipe line, refinery, and process operation, has been prepared by the Sawyer-Jensen-Ross Co., designers and manufacturers of the mixer. Copies are available on request to S-J-R, Tulsa 4, Oklahoma.

E. P. Davis

Landmen Organize

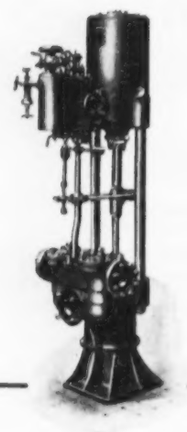
Edwin P. Davis, land supervisor for the British-American Oil Producing Co., has been elected president of the recently organized Dallas Landmen's Association. Vice presidents of the new organization are J. W. Rawley, Seaboard Oil Co. of Del.; Buford F. Sutherland, Atlantic Refining Co.; and Frank Carr, American Liberty Oil Co. E. H. Gunter was elected secretary, J. L. Toone, Lone Star Producing Co., treasurer, and Wesley Weed, Sun Oil Co., sergeant-at-arms.

Lectures Before French Institute

Dr. Gustav Egloff, of Universal Oil Products Co., lectured before the French Institute of Petroleum, Paris, on January 12, and the French National Society of Engineers on January 13. He also gave a series of lectures in Spain during the month of December, and addressed the National Society of Chemists and Engineers in Madrid on January 2.

using every unit of energy

BOILER FEED PUMPS



"Hall" Boiler Feed Pumps are designed to make use of every unit of energy from steam before it is passed to exhaust. Of the Vertical Single Cylinder Direct and Double-Acting type, the standard range covers capacities from 250 to 10,000 gallons per hour. Over 50 years specialist experience is behind these pumps, plus first class materials and workmanship. TURBINE Driven Centrifugal Feed pumps are available for duties from 4,000 to 35,000 gallons per hour.

PUMPS FOR HANDLING OIL IN BULK

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GAS ENGINEERS' HANDBOOK—Gas Engrs. Handbook Committee	$12.00
HANDBOOK BUTANE PROPANE GASES—Butane Propane News	$ 7.50
HANDBOOK OF CHEMICAL ENGINEERING—Donald M. Liddell	$ 8.00
IGNEOUS AND METAMORPHIC PETROLOGY—Turner and Verhoogen	$ 9.00
INDUSTRIAL PIPING—Charles T. Littleton	$ 8.00
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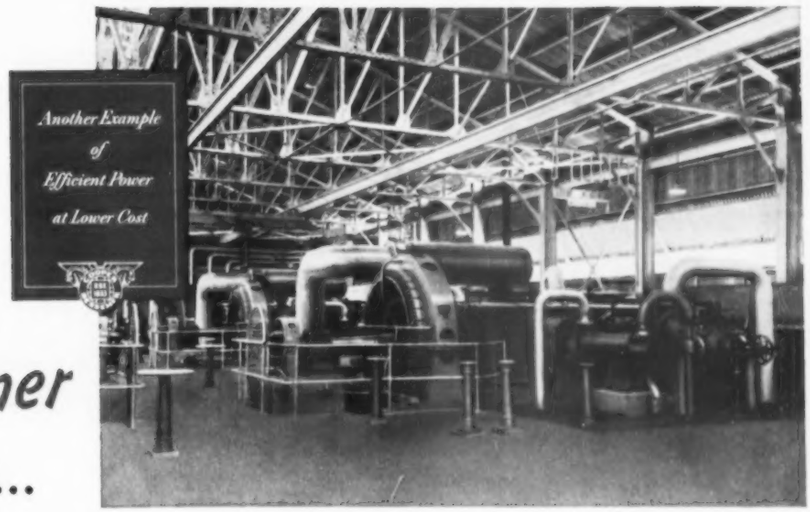


Cooper-Bessemer

MODERN DESIGN...

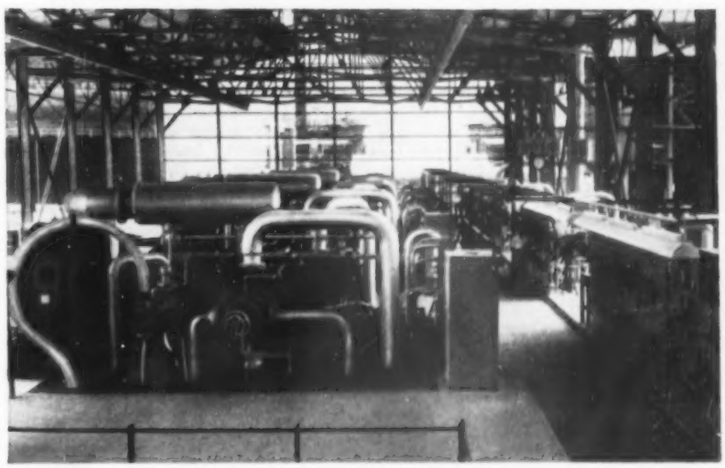
for compressors at Sindri . . . at Suez . . . everywhere!

Shown opposite are Cooper-Bessemer motor-driven compressors in two of the world's newest and largest synthetic ammonia plants.

The top view shows part of the 22,000 Cooper-Bessemer M-Line compressor horsepower installed in the ammonia synthesis plant of the Sindri Fertilizer Factory, Bihar Province, India. Here, ammonium sulphate can be produced at a rate of 1,000 tons a day — 350,000 tons a year!

Similarly the other photo shows a line-up of Cooper-Bessemer compressors in the large Suez plant of the Societe Egyptienne D'Engrais et D'Industries (S.A.E.), Egypt. Here, calcium nitrate fertilizer is produced at a rate of 200,000 tons yearly.

In both plants, these modern Cooper-Bessemer units handle the entire compressing job and comprise the heart of production operations. For, with Cooper-Bessemers, you can be sure of year-in, year-out performance at the lowest operating cost.



Cooper-Bessemer M-Line motor-driven compressor in the synthesis section of the Sindri Fertilizer Factory, India. Here eight 2,750 hp 7-cylinder units compress gas through six stages to a pressure of 5,500 psi. The huge Sindri plant was engineered by the Chemical Construction Corp., New York, and built under the direction and supervision of the Power-Gas Corp., Ltd., England.

Here, in the Suez plant of the Societe Egyptienne D'Engrais et D'Industries (S.A.E.), these four 2,750 hp JM-5 motor-driven units compress 25,344 mcf of gas daily from atmospheric to 5,200 psi for initial calcium nitrate production of 200,000 tons yearly. This plant, engineered by the Chemical Construction Corp., utilizes waste gases from nearby oil refineries.

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Sells Interest in GSI

Geophysical Service Inc. announces that H. B. Peacock has sold his interest in GSI and affiliated companies to his associates and has resigned as a director. He expects to enter the geophysical consulting field. Mr. Peacock entered the field of exploration geophysics with Geophysical Research Corp. in 1926 and has been associated with GSI since its organization in 1930. He is a past president of the Society of Exploration Geophysicists and has been active in the Society for many years.

New Stanvac Offices Planned

Standard-Vacuum Oil Co. has completed negotiations for the purchase of a 25-acre office building site in Rye, New York, where it plans to move its New York City offices sometime in 1954. Subject to changes in present zoning regulations, a modern office building will be constructed on the property to house the company's staff of more than 700 persons who are now scattered in three downtown New York locations.

Form Petrochemical Firm

Goodrich-Gulf Chemicals, Inc., has been organized by Gulf Oil Corp. and the B. F. Goodrich Co. to explore projects in the petrochemical field in which the parent companies have strong complementary interests. A plant site is being obtained at Orange, Texas. The head office will be in Pittsburgh.

Pan-Am Southern Appointment

Hal R. Yockey has been appointed advertising manager of Pan-Am Southern Corp. to succeed the late Kenneth A. Rotharmel, advertising manager for Pan-Am for 26 years, who died last month. Mr. Yockey was a member of the news staff of The Times-Picayune before joining Pan-Am in January, 1951.

Catalytic Appointments

Dominic J. Oriolo has been added to the process engineering staff of the Catalytic Construction Company as project director on one of Catalytic's major operations.

Mr. Oriolo came to Catalytic from Rohm and Haas, where he spent five years as a plant development engineer dealing with design, operation and technical service of chemical plants. Prior to that he had acquired eight years of experience in design, development and operation of pilot plants for petroleum and petrochemical processes.

Francis W. Winn has been appointed assistant chief process engineer for Catalytic Construction Co. His responsibilities include research and development, process design and theoretical correlations. Mr. Winn came to Catalytic from the research and development department of the Socony-Vacuum Oil Co., where he specialized for five years in process design and economic studies of refinery equipment and developed an exact computation procedure for multicomponent fractionation.

Enjay Elects Three Directors

Three new members have been elected to the board of directors of Enjay Company, Inc. They are B. L. Ray, a director and assistant general manager of marketing of Esso; J. P. Warner, general superintendent of the Baton Rouge, Louisiana refinery; and A. Bruce Boehm, assistant general sales manager of Enjay. Messrs. Ray and Boehm will replace L. E. Ulrope and E. H. Collins as Enjay directors.

Fulton Returns To U.S.

David Fulton has returned to the main office of the Lummus Co., 385 Madison Avenue, New York. For a number of years Mr. Fulton has been manager of Lummus' French affiliate, Societe Francaise des Techniques Lummus, in Paris. He returns to become assistant to the president.

F. W. Winn

D. J. Oriolo

This unusual photograph of storage tanks typifies the qualities of "International" paints; the products for the petroleum industry are unusually good. [illegible] this standard did not just happen, [illegible] was reached after pursuing a policy of producing the right paint for the purpose. For instance, among other products used throughout the industry "International" makes special paints for the protection and decoration of drums.

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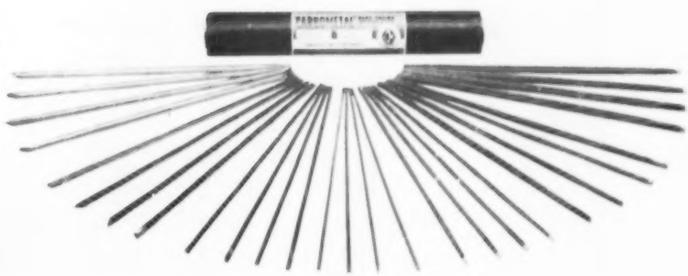

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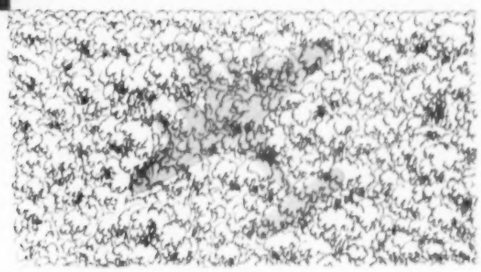
From Tokyo to Karachi; from the minerally rich highlands of Southern Africa to the coastal cities of Australia and New Zealand, the varied petroleum products of Standard-Vacuum weave in some way through the whole pattern of living.



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the HORTON VAPORTANK

prevents Evaporation Losses from Fixed Roof Tanks

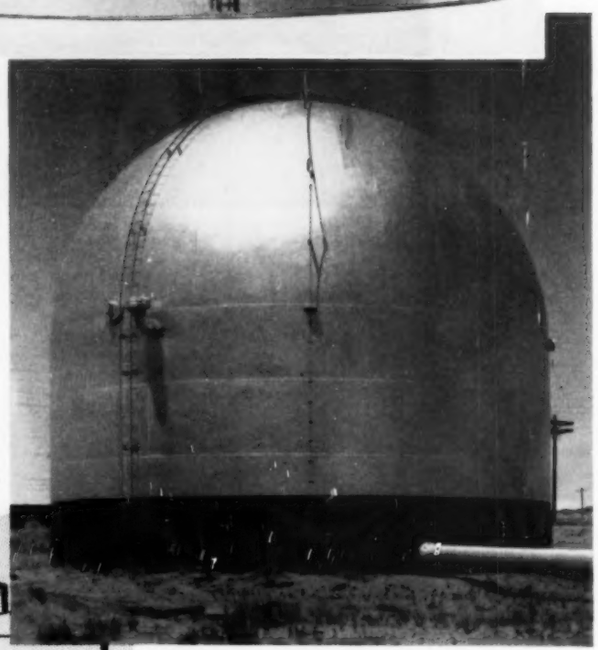
A Horton* Vaportank consists of a cylindrical steel shell with a hemispherical top and flat bottom. Inside the shell is a hemispherical flexible membrane, the outer edge of which is attached to the top of the straight portion of the tank shell. When the Vaportank is connected to the vapor space of one or more fixed-roof tanks by light weight, large-diameter piping, vapor forced out of the fixed-roof tanks—either by breathing due to increased temperature or by displacement caused by filling—flows through the lines to be stored under the membrane. The membrane rises to provide room as additional vapor is stored.

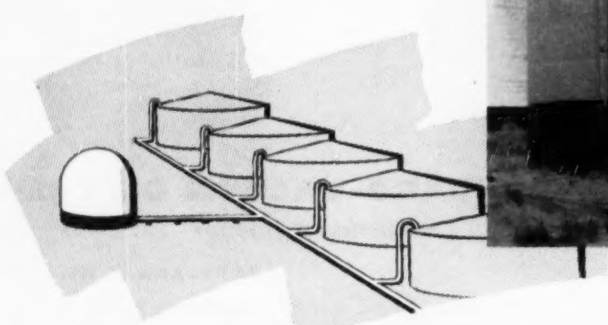
When conditions causing the displacement of vapor are reversed, the vapor returns to the tanks and the membrane returns to its original position. No vapor is allowed to escape or be vented to the atmosphere.

The membrane used in the Horton Vaportank is made of Chi-lon*, a tough, durable fabric, coated on both sides with impervious petroleum-resistant synthetic rubber.

The Horton Vaportank shown at the right, is located at a U. S. petroleum refinery. Its capacity of 50,000 cu ft. provides storage space for displaced vapor from several interconnected fixed-toof tanks.

Other Horton structures that incorporate the same principle of a flexible membrane are the Horton Vaporsphere and the Horton-dome Roof. Further information, estimates or quotations on either of these structures or on the Horton Vaportank may be had by writing our nearest office.





Top: Cutaway view of Horton Vaportank showing flexible hemispherical membrane. Right: 50,000 cu. ft. Horton Vaportank at a petroleum refinery in the United States.

*Trade Mark registered in U. S. Patent Office.

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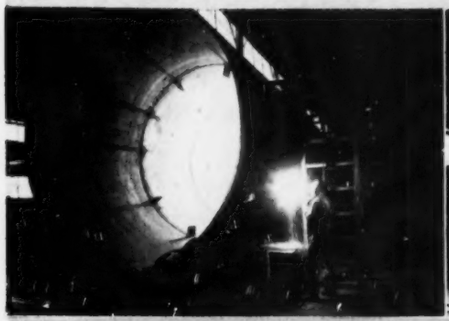

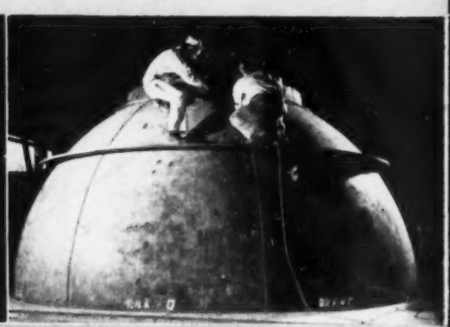

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